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Essays on Corruption

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ESSAYS ON CORRUPTION

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Dedicated to my grandparents Kashikant and Tara Jha
and
my parents Sudhir and Durga Jha.

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Abstract

Corruption is a global concern and requires attention because of its detrimental effects on economic growth and development. This dissertation includes three different essays that identify some of the instruments that can be used to fight corruption. The first essay investigates whether women's presence in economic and political arenas can have a significant impact on corruption. It finds evidence that while women's presence in parliament does reduce corruption other measures of female participation in economic activities are shown to have no effect. The second essay shows that internet and Facebook have an adverse effect on corruption. Finally, in a theoretical analysis the concluding essay finds that an asymmetric liability policy may not be effective in reducing bribery. A modification in the asymmetric liability policy is suggested and is shown to be more effective.

Chapter 1. Introduction

> *Just as it is not possible not to taste honey or poison placed on the surface of the tongue, even so it is not possible for one dealing with the money of the king not to taste the money in however small a quantity. Just as fish moving inside water cannot be known when drinking water, even so officers appointed for carrying out works cannot be known when appropriating money. It is possible to know even the path of birds flying in the sky, but not the ways of officers moving with their intentions concealed.*
>
> *Kautiliya's Arthasastra* (Kangle, 2000, p-91)

Corruption is an age-old problem and has been present in various forms such as bribery, extortion, cronyism, nepotism and embezzlement since the beginning of the civilization. In simplest terms, corruption is any act that is intended to wrongfully increase the private gain of an individual who is able to do so because of the power granted to him by the public or an institution democratically elected by the public. In most of the cases, detecting corruption is very difficult, more so when the act of corruption or bribery is mutually beneficial. For instance, imagine a scenario where a person or a firm makes hidden extra payments to an official in exchange for a service or a license that the former is not entitled to. In this case, neither the bribe payer nor the bribe taker has an incentive to report bribery and therefore it's very difficult, if not impossible, to detect the bribery and prove it in the court of law. Such acts of bribery are known as collusive bribery where both the involved parties gain undue advantages from the corrupt contract. Although an act of extortionary bribe or harassment bribe involves a victim–the bribe giver who is forced to pay a bribe in order to receive the services he/she is entitled to–establishing even such acts of bribery is often difficult since the victim has little incentives to report the bribe not only because there is a moral dilemma involved, but also because in many countries the bribe givers are also subject to legal sanctions. It is because of this very nature of corruption that it is very difficult to fight corruption.

Though it is difficult to measure actual corruption in a country, the World Bank and Transparency International publish corruption perception indices – the Control of Corruption Index (CCI) and Corruption Perception Index (CPI) respectively, for a large number of countries of the world, which reflect the perception of corruption in these countries. The CCI takes values in the range of -−2.5 to 2.5, and the CPI takes values in the range of 0 to 10: A higher index in both the indices implies a lower corruption. Not a single country in the world is entirely free from corruption as indicated by these indices. While a large proportion of countries has a very low score on these indices, none of the countries scores a perfect. For example, in 2011, New Zealand had the highest CPI, 9.46 out of the maximum possible 10 (least corrupt), while Denmark had the highest score in the CCI, 2.42 out of the maximum possible 2.5 (least corrupt). Somalia had the lowest scores, a CPI of 0.98 (the lowest possible score is 0), and a CCI of -1.72 (-2.5 is the lowest possible score).[1]

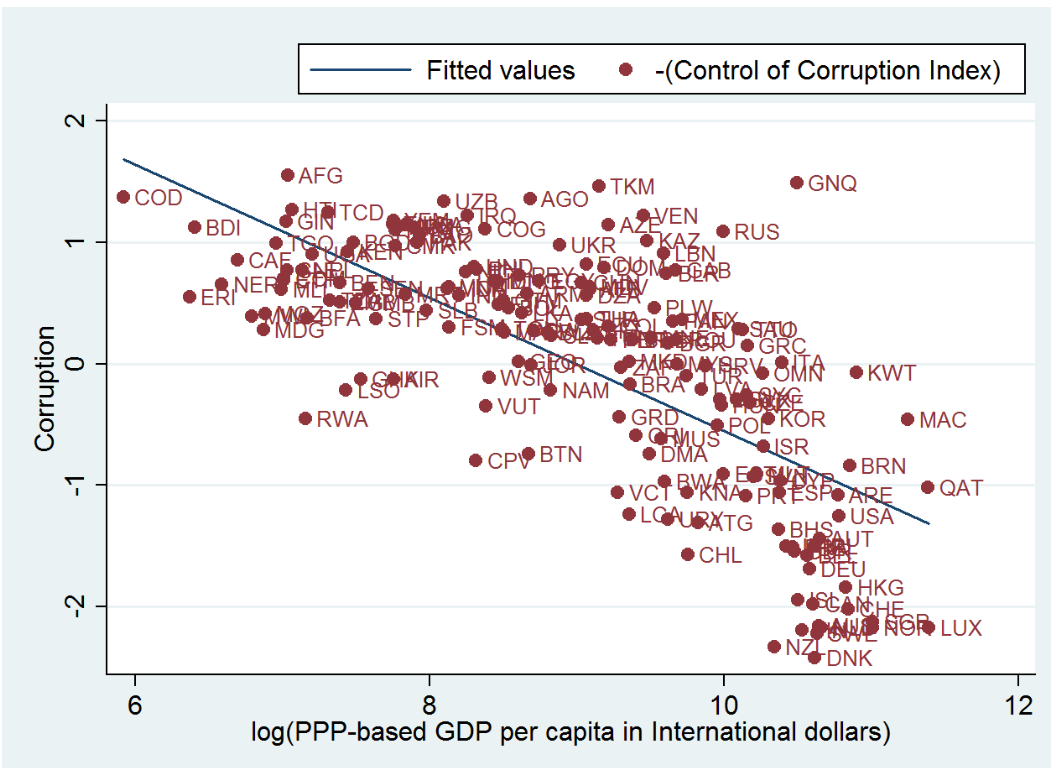


Figure 1.1: Income and Corruption

[1] For details on how these indices are constructed, please refer to the data section of Chapter 2.

Although every country of the world faces the problem of corruption, as we can see in Figure 1.1, the problem of corruption is worse in poor countries than in rich countries. The figure suggests a negative association between the level of income and corruption in a country. One of the several reasons for this association is that poor countries are faced with the limited resources to fight corruption. At the same time, it has also been shown that corruption leads to an increase in poverty. This bidirectional relationship may cause corruption to be a persistent problem in poor countries.

Table 1.1: Least and Most Corrupt Countries in the World, 2011

Rank	Country	Country Code	GDP Per Capita (International $)	Control of Corruption Index	Corruption Perception Index
Least corrupt countries according to the 2011 CCI					
1.	Denmark	DNK	42,802.9	2.42	9.39
2.	New Zealand	NZL	31,683.5	2.33	9.46
3.	Sweden	SWE	43,874.9	2.22	9.30
4.	Finland	FIN	40,280.3	2.19	9.40
5.	Luxembourg	LUX	90,297.4	2.17	8.51
Most corrupt countries according to the 2011 CCI					
5.	Equatorial Guinea	GNQ	35,182.5	-1.49	1.91
4.	Afghanistan	AFG	1,695.2	-1.55	1.52
3.	South Sudan	SSD	3,504.8	-1.65	–
2.	Myanmar	MMR	1,125.9	-1.69	1.49
1.	Somalia	SOM	128.1	-1.72	0.98

The CCI takes values in the range of -2.5 to 2.5, and CPI takes values in the range of 0 to 10. A higher value of both the indices implies lower corruption. Purchasing power parity based Gross Domestic Product per capita is measured in current international dollars. The GDP per capita data are reported for year 2011 except for Somalia and Myanmar for which data are reported for year 2012. The data source is the World Bank except for Somalia and Myanmar for which the data source is the United Nations. and data are reported for year 2012. The CCI covers more countries than CPI and hence missing values for the CPI.

Table 1.1 lists five least and most corrupt countries in descending order of corruption as measured by the CCI. As can be seen in the table, some of the least corrupt countries of

the world, according to one of the most used corruption indices in corruption literature, the CCI, are also one of the richest. For instance, Denmark, New Zealand, Sweden, Finland, and Luxembourg are amongst the five least corrupt countries in the world according to the 2011 Control of Corruption Index. On the other hand, with the exception of Equatorial Guinea which is endowed with large oil reserves, all the countries that figure in the list of five most corrupt countries in 2011–Somalia, Myanmar, South Sudan, and Afghanistan–are also one of the poorest countries in the world. Table A.1 in the appendix provides corruption indices for all the countries in the world.

The act of corruption can have detrimental consequences for economic growth and development. A plethora of the empirical literature has emerged with an objective to find the causes and the consequences of the corruption as well as finding remedies to tackle this problem. This literature points out a number of potential factors–economic, cultural, legal, democratic, institutional, technological–that can explain corruption. For instance, economic factors such as income levels, economic inequality, the openness of an economy have been shown to have an impact on corruption. Cultural factors such as a hierarchical structure and ethnic fractionalization are found to impact corruption. Democratic factors such as political rights and press freedom, technology such as internet penetration, and legal system and colonialism have been shown to determine corruption in a country. There are also a few studies that have introduced a gender aspect to corruption.

The biggest issue in the empirical literature is to establish causality, which is particularly more difficult in the corruption literature. A sizable body of empirical corruption literature is plagued with the problem of endogeneity, especially because of the presence of unobserved country-specific fixed factors. These unobserved country-specific factors pose the biggest challenge in the empirical corruption literature owing to the invariability of corruption indices over time for the majority of countries which makes it infeasible to carry out a panel study in corruption. It is well-known that in the presence of omitted variables, the Ordinary Least Squares (OLS) is inconsistent. Under these circumstances, a researcher is faced with an

enormous task of identifying appropriate instruments that are both valid and strong. A valid instrument is correlated with the endogenous variable and does not have any impact on the dependent variable (in this case, corruption) except via its effect on the variable that is being instrumented. The recent literature, however, has developed methods that can be used to make robust inferences when the instruments, though valid, are not strong (Moreira, 2003; Kleibergen, 2002). This dissertation deals with the issue of causality by identifying appropriate instruments and uses the conditional likelihood ratio approach to draw robust inferences whenever the instruments are not strong.

This dissertation deals with three different aspects of corruption. The second chapter of this dissertation revisits the gender aspect of corruption that claims that (a) there is a negative association between women's share in the labor force and corruption, and (b) there is a negative association between women's share in parliament and corruption. Revisiting this relationship is important because the issue of causality has not been resolved, and there is no conclusive evidence of a causal association between women's presence in the spheres mentioned above and corruption. The third chapter proposes a novel instrument to fight corruption and shows that the social media can be used as a tool to fight against corruption. The fourth chapter goes into the legal aspects of corruption and presents a theoretical investigation of different legal systems on corruption. The chapter ends with proposing certain measures to fight corruption effectively. Finally, conclusions are drawn in Chapter 5.

1.1 Gender and corruption

In many economic settings women have been found to behave differently from men and have even been shown to be less selfish than men (see Eckel and Grossman, 1998 and references therein). Based on this finding a strand of literature has explored the role of gender in determining corruption, and has investigated whether women in the labor force can impact

corruption (Swamy et al., 2001) and whether women in the parliament and government can have a negative impact on corruption (Swamy et al., 2001; Dollar et al., 2001). These studies find that gender representation in the labor force and government is negatively associated with corruption. The later studies, however, questioned these results and argued that this relationship is not causal. These studies argued that it is the omission of some of the relevant factors such as liberal democracy and women's exposure to bribe taking activities from the model that causes a spurious relationship between gender and corruption (Sung, 2003; Goetz, 2007). In an experimental study, women are even found to be more opportunistic when there is a possibility to break a corrupt contract (Frank et al., 2011).

The evidence on the corruptibility of women, therefore, is essentially mixed giving rise to the need for determining whether the observed relationship between gender and corruption is causal. The second chapter of this thesis deals with the problem of endogeneity and address the causality issues by using instruments for women's presence in economic and political activities. The chapter explores the historical and linguistic factors that can explain modern gender inequality and hence prove to be good instruments for women's participation in economic and political activities. These instruments, however, are not always strong. This issue is overcome by using newly developed methods that allow for robust inferences in the presence of weak instruments.

Apart from investigating the impact of gender representation in the labor force and in parliament on corruption, this chapter also introduces two new measures of women's presence in economic activities, that is, women's share in decision making positions and women's share in clerical positions, and looks at their impact on corruption. This exercise is carried out with an objective to identify the specific roles in which women can affect corruption and to gain insights on the interaction between women's presence in economic and political activities on corruption. The chapter also discusses the potential channels through which women are able to have an impact on corruption. Finally, the chapter also provides evidence regarding a much-cited hypothesis which argues that the observed association between gender and

corruption will vanish over times as this association may have actually been driven by the gender differences in social status or because of the possibility that women may have limited access to networks of corruption (Swamy et al., 2001; Goetz, 2007).

1.2 Social media and corruption

The advent of the information and communication technology (ICT) has changed our lives drastically and has expanded our political, social and economic freedom. ICT provides multi-way forms of communication and, therefore, establishes a superiority over the print media and broadcast media which provide only one-way communication and has been subject to censure and control by the authoritarian regimes. These regimes have censored and controlled the information that can be accessed by the public. Often the cases of corruption, human rights violations and police brutality have been taboo subjects for citizens and have been censored in several countries such as China, Malaysia, and Iran. The invention and spread of internet challenged the monopoly of the governments in authoritarian regimes on the sources of information and resulted in this information to be available to the public. Recently the use of social media has augmented these effects. By providing multi-way communication, the social media and internet make it difficult for the authoritarian regimes to censor information.

The influence of the internet in undemocratic societies has been so profound that it has given rise to the concept of "Dictator's Dilemma". The dictator's dilemma refers to the trade-off that a dictator has to face – an increased internet penetration allowed by the dictator increases the risk of overthrow (by providing activists with a platform to organize resistance against the dictator), and restricting internet availability will hinder economic growth by cutting the economy off the world, and exchange of ideas (Kedzie, 1997). The internet and the social media promote transparency, communication of information, sharing of ideas, and help mobilize support for a social cause. The social media were extensively used in the Middle-East uprisings and have been recognized to play an instrumental role in

the success of uprisings in Egypt, Libya, Tunisia, and Yemen (Howard and Hussain, 2011; Dalacoura, 2012). In words of an Egyptian protester - *"We use Facebook to schedule the protests, Twitter to coordinate, and YouTube to tell the world"*.

Based on above facts, the third chapter of this thesis explores the possibility that increasing use of social media may have a negative impact on corruption. Social media platforms have extensively been used to mobilize support and organize protests against corrupt activities in India and have helped these anti-corruption movements to be successful (Jha, 2014). In addition, the chapter also revisits the relationship between internet penetration and corruption.

1.3 Legal system and corruption

Countries differ in their legal systems and their laws against bribery. While certain acts can be termed as bribery and, therefore, may be subject to legal punishment in some countries, these acts may be perfectly acceptable in other countries. The legal system also differs across countries in their treatment of the bribe giver and bribe taker. For instance, in a number of countries such as China, Japan, and Russia the legal punishment for bribe givers is milder than that for the bribe takers. On the other hand, other countries such as Germany, India, the United Kingdom, and the United States treat bribe-giver as well as bribe-taker equally culpable. A legal system that treats both the bribe giver and the bribe taker equally culpable is known as the symmetric liability regime. The asymmetric liability regime, on the other hand, is lenient on the bribe giver and severely punishes the bribe taker.

Basu (2011) proposed that India should implement asymmetric liability for a class of bribes known as *harassment bribes* in which a person is forced to pay a bribe to avail the services he/she is entitled to. He argued that doing so will result in a decrease in bribery since the bribe giver will have a greater incentive to report bribery given that she will not be subject to legal sanctions anymore. This proposal, however, was not free from criticisms and

it was argued that moving from a symmetric liability regime to an asymmetric liability regime may not necessarily lead to a decrease in bribery, and may even increase it (Drèze, 2011). The proposal was also criticized on the grounds that it may promote unethical behavior and may make bribe giving an acceptable norm.

The fourth chapter of this thesis evaluates the merits of an asymmetric liability policy and theoretically investigates whether this policy has a potential to reduce bribery and whether it requires additional policy modifications to incentivize the bribe giver to report bribe incidents. The chapter also suggests some modifications in the asymmetric liability policy in order to produce desired outcomes and mitigate the problem of morality which such policies might bring in.

1.4 Contribution of this dissertation to the corruption literature

The main contributions of this dissertation in the literature studying corruption include, but is not limited to, the following

- **Establishing causality in gender-corruption literature:** This dissertation is the first in gender-corruption literature to use an instrumental variable (IV) analysis and establishes causality.

- **Women's role in determining corruption:** Chapter 2 of this dissertation identifies the precise role in which women are able to reduce corruption. The chapter also provides evidence that, contrary to the hypothesis of the previous studies, the relationship between gender and corruption is unlikely to vanish as women get similar in status as men.

- **Social media and corruption:** Chapter 3 of this dissertation is the first quantitatively comprehensive study that provides evidence to support the hypothesis that social media can be used as a tool against corruption. The chapter also uses a dif-

ferent instrument to show that the relationship between the internet penetration and corruption shown by earlier studies is robust.

- **Legal system and corruption:** The dissertation also develops a theoretical model to show that legal system matters for corruption and changes in legal systems have the potential to reduce corruption in many, especially developing, countries of the world. The dissertation also cautions against a blind replication of legal regimes by showing that the impact of a legal regime on bribery depends on several other factors and that these must be taken into account while contemplating a change in legal policies.

Chapter 2. Women and Corruption: What Positions Must They Hold to Make a Difference?

2.1 Introduction

Corruption remains an important issue both in poor countries and advanced economies because of its negative impact on economic outcomes such as investment, economic growth, and per capita income.[1] Little over a decade ago a gender dimension was added to this topic through two classic papers by Swamy et al. (2001) and Dollar et al. (2001), both drawing on the notion that women behave differently from men in many economic circumstances.[2] The latter study found a negative correlation between women's presence in parliament and corruption, while the former reported lower corruption to be correlated with both women's presence in the labor force as well as in parliament using cross-country analysis. Subsequently, however, a number of studies have voiced concerns that this observed negative association between gender and corruption was not causal and driven by the omission of other factors that might be correlated with women's participation and/or corruption in a country. In this chapter, we address the concerns raised in this literature by *first* looking for a causal relationship between gender and corruption using instrumental variable (IV) analysis and *second* by taking a more nuanced approach to this problem by identifying different economic roles women can take vis-a-vis corruption and investigating the impact of each on corruption.

We start by pointing out that the term "labor force" which has been found to be negatively correlated with corruption in earlier studies is a very broad measure and does not

[1] For instance, a higher level of corruption is associated with lower levels of GDP per capita (World Bank, 2001); lower rates of investment and economic growth (Mauro, 1995); high inequality and poverty (Gupta et al., 2002).

[2] A number of studies support this hypothesis (see Eckel and Grossman (1998) and references therein).

make clear how women affect corruption. For example, women may affect corruption if they are less corrupt and accept fewer bribes than men. Alternatively, women can affect corruption when they are in positions of power such as heads of their organizations, by designing and implementing stringent anti-corruption laws within their organizations or making the existing laws more strictly enforceable. Since female participation in the labor force consists of women in both the roles – the bribe-taking role as well as the decision-making role, it is important to distinguish which of these roles (or a combination of the two) is associated with lower corruption. In order to capture these roles, we introduce two additional measures of female participation in economic activities: (i) the share of women in clerical positions, and (ii) the share of women as legislators and managers. While the first measure indicates the presence of women in potential bribe-taking positions, the second measure indicates their presence in decision-making positions. Finally, in keeping with the earlier literature, we narrow down this somewhat broader measure of women's presence in positions of power to only their presence in policy-making positions, and examine the relationship between the share of women in parliament and corruption. The investigation of the relationship between these four different measures of female involvement and corruption enables us to identify the exact role in which women are able to effectively reduce corruption.

A possible reason behind the lack of studies identifying a causal relationship between gender and corruption could be the fact that a panel study on corruption is not possible due to the invariability of corruption indices over time, and finding instruments that are both valid and strong is a daunting task as well. Moreover, the determinants of women's presence in different occupations are likely to be different, and hence, an instrument that works well for women's presence in one occupation need not work well for their presence in other occupations giving rise to the need of finding more than one instrument. In an attempt to establish causality, we take up this challenge by looking at some of the recent studies that discover historical and linguistic determinants of women's presence in different occupations. We identify such potential instruments that have predictive powers for women's presence

in different positions, yet there is little reason to expect a direct effect of these variables on corruption. We experiment with multiple instruments to explore the causal relationship between the share of women in parliament and corruption. While using more than one instrument for one endogenous variable allows us to check for the validity of our instruments conditional on at least one of our instruments being valid, our instruments tend to be weak in some specifications which may lead to invalid inferences. We overcome this possibility by using the conditional likelihood ratio (CLR) approach developed by Moreira (2003) for hypothesis testing that provides for the robust inferences in the presence of weak instruments.

Another concern may be that our findings of women's presence in politics and its effect on corruption is driven by country fixed effects. To address this issue, we use data from 155 regions from 17 European countries and find that there is a negative association between women's share in the local government and corruption.

The next question that this chapter addresses is regarding the *persistence* of the observed association between women's presence in different positions and corruption. It has been argued that women are not actually less corrupt, and the observed association between different measures of female participation and corruption is actually driven by gender differences in the social status limiting women's access to corruption.[3] To the best of our knowledge, this chapter is the first to investigate this hypothesis that the rate of corruption among women will converge to that among men as gender-gap in social and economic status narrows down.

Women may have better access to corrupt practices and activities over the years as they get similar in status to men and may also have greater exposure to bribe-taking activities. As a result, it is possible that the negative relationship observed by previous studies may no longer be valid. Hence, quite aside from the fact that we have addressed the concerns of the previous studies and provided new insights, the present study is also a timely re-investigation of this topic to the extent allowed by the availability of data and empirical limitations.

[3] Swamy et al. (2001) clarify *"... we do* not *claim to have discovered some essential, permanent or biologically determined differences between men and women. Indeed, the gender differences we observe may be attributable to socialization, or to differences in networks of corruption, or in knowledge of how to engage in corrupt practices, or to other factors."*

Our main results are as follows. The role in which women have an impact on corruption is through their presence in politics. Using an IV approach we show that this relationship is robust and causal. Moreover, our findings hold at both, the national and sub-national, levels. We also show that the observed negative relationship between female participation and corruption cannot entirely be explained by gender differences in social status.

The rest of the chapter is organized as follows. In the next section, we discuss our sources of data and specify empirical strategy as well as establish the validity of our instruments. Section 2.3 reports cross-country OLS and IV results, and section 2.4 presents sub-national evidence. We check whether there is an evidence of "corruption convergence in gender" in section 2.5 and discuss the implications of our findings in section 2.6.

2.2 Data and empirical strategy

2.2.1 Data

The primary measure of corruption used in this chapter is the Control of Corruption Index (CCI) published by the World Bank. The CCI lies in the range of −2.5 (most corrupt) to 2.5 (least corrupt) and is a continuous variable. We use negative of the CCI in all our specifications such that a higher number indicates more severe corruption. The CCI has been constructed in a way that mean of the index is 0 and the standard deviation is equal to 1. The purpose of CCI, as described by Kaufmann et al. (2011), is – *"capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests"*.[4] The index combines information available from a combination of surveys of firms and households, subjective opinion of business analysts, non-governmental organizations (NGOs) and public sector agencies assigning larger weights to sources that have similar findings.

[4]For details of data sources, questions and methodology used in computing the CCI, see Kaufmann et al. (2011) and also visit http://info.worldbank.org/governance/wgi/resources.htm.

In the construction of the Control of Corruption Index (CCI), a diverse group of people are surveyed and their perception regarding corruption in the country is recorded.[5] The index is then generated on the basis of a combination of surveys of firms and households, as well as the subjective opinion of business analysts, non-governmental organizations (NGOs) and public sector agencies. Thus, the index combines the information available from these independent and reputed sources assigning larger weights to sources that have similar findings. The index allows for the data sources to change over time – new sources of data may be introduced and sometimes existing sources of data may be dropped in creating the CCI. This is done in order to ensure that the index is comparable over time. As a result of changes in data sources there may also be slight changes in the scores of a country in two different versions of data published in different years.

The data for the share of women in the labor force (WP) comes from the *International Labor Organization (ILO)*. The United Nations Statistics Division (UNSD) provides data for the share of women in clerical positions and the share of women in decision-making positions.[6] Data for the percentage of women in parliament is compiled by the *Inter-Parliamentary Union (IPU)* and has been taken from the World Bank. It provides the percentage of parliamentary seats held by women in a single or lower chamber. All measures of female participation used in this chapter are the *percentage* of women in the respective category.

[5] Some of the questions asked by data sources (surveys and expert opinions) that form a part of the CCI are as follows - "Is corruption in government widespread?" "How many elected leaders (parliamentarians) do you think are involved in corruption?" "How many judges and magistrates do you think are involved in corruption?" "How many government officials do you think are involved in corruption?" "How many border/tax officials do you think are involved in corruption?" "How common is for firms to have to pay irregular additional payments to get things done?" "How often do firms make extra payments in connection with taxes, customs, and judiciary?" "How problematic is corruption for the growth of your business?" "To what extent does corruption exist in a way that detracts from the business environment for foreign companies?" The objective of some other sources is to include questions regarding the 'frequency of household bribery', 'frequency of corruption among political parties, parliament, media, judiciary and public official', 'transparency, accountability and corruption in public sector', 'anti-corruption policies' and so on.

[6] The share of women in decision-making positions, as per the International Standard Classification of Occupations 1988 (ISCO-88), includes: 11. legislators and senior officials; 12. corporate managers; and 13. general managers. According to ISCO-88, the clerical positions include: 41. Office clerks; 42. Customer service clerks. In the sample, some countries also report employment statistics according to the earlier edition, ISCO-1968. Visit http://laborsta.ilo.org/applv8/data/isco68e.html for the details on ISCO-1968 and http://laborsta.ilo.org/applv8/data/isco88e.html for the details on ISCO-1988 classification of other job-categories included under these broader groups.

We use Gross National Income per capita (formerly Gross National Product (GNP) per capita) in US dollars obtained from the World Bank as a measure of income and refer to it as $GNPPC$. The Association of Religion Data Archive (ARDA) provides data on proportions of Christians ($Christian$) and Muslims ($Muslim$) in the total population.[7] Note that the latest year for which data is available for these variables is 2005. Data for the colonial history of countries has been taken from Treisman (2007). Freedom House awards a score of 1 through 7 for political rights – a score of 1 indicates that the citizens enjoy a wide range of political rights while a rating of 7 implies few or no political rights.[8] Summary statistics are presented in Table 2.1.

2.2.2 Empirical Specification

We estimate the following equation using OLS which is our baseline specification

$$\begin{aligned} Corruption_i = \alpha + \beta WP_i + \gamma_1 GNPPC_i + \gamma_2 Political\,Rights_i + \gamma_3 Christian_i \\ + \gamma_4 Muslim_i + \gamma_5 Past\,UK\,Col_i + \gamma_6 Never\,Colonized_i + \varepsilon_i \end{aligned} \tag{2.1}$$

where $Corruption_i$ is the index of corruption in country i, and WP_i stands for the share of women in different positions in country i, depending on the specification. The dummy variable $Past\,UK\,Col_i$ takes a value of 1 if country i is a former British Colony, and 0 otherwise. $Never\,Colonized_i$ takes a value of 1 if country i was never colonized, and 0 if country i has a colonial past. As discussed earlier, we use the negative of the CCI in all our regressions, and therefore, the coefficient β is expected to be negative.

GNP per capita has been added as a control variable in all the specifications because it has been argued that countries with higher incomes may be able to constrain corruption

[7] The data was downloaded from http://thearda.com. The principal investigators in this data collection are Jaime Harris, Robert R. Martin, Sarah Montminy, and Roger Finke of the ARDA.

[8] Visit http://www.freedomhouse.org/report/freedom-world-2012/methodology for the details on how political rights index is computed.

Table 2.1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	Obs.
Control of Corruption Index	0.058	0.99	-2.466	1.531	154
Corruption Perception Index	-4.734	2.349	-9.470	-1.7	85
Share of Women in the Labor Force	41.179	8.707	13.613	54.211	154
Share of Women in clerical positions	59.218	19.277	3.216	91.406	91
Share of Women in decision-making positions	27.502	10.73	3.461	54.819	91
Share of Women in Parliament	16.348	9.693	0.2	45.49	113
Per Capita Gross National Product	9154.460	13902.745	120	64003	154
Years of Schooling (2010)	8.097	2.684	1.755	13.097	127
Christian Proportion (2005)	55.48	37.512	0.167	98.155	154
Muslim Proportion (2005)	23.905	34.064	0	99.129	154
Proportion in largest ethnic group	68.643	24.515	17	100	133
Political Rights	-3.423	2.046	-7	-1	154
Civil Liberty	-3.29	1.667	-7	-1	154
Openness to Trade	47.543	23.563	12.233	188.13	128
Gender Inequality Index (2008)	0.393	0.194	0.391	0.773	124
Social Institutions and Gender Index (2009)	0.121	0.114	0.002	0.678	92
Power Distance Index	59.525	22.591	11	104	61

Variables – *Corruption Perception Index, share of women in the labor force, share of women in parliament, political rights, GNPPC, Civil liberty* are averaged over a period of 10 years (2001 - 2010). The Control of Corruption Index was not computed for year 2001, hence, 2001 index is replaced by 2000 index to compute the 10-year average. Data for the share of women in clerical positions and decision-making positions belong to the latest year (2000 - 2008) for which the data is available. The year indicated in brackets to the next of a variable indicates the year to which this data belongs. Averaging of the variables over a period of 10 years would ensure that the estimates are not disproportionately affected by any specific event in a given year.

more effectively than poor countries (Treisman, 2000). Countries with long democratic histories are less corrupt (Treisman, 2000). Therefore, in countries with strong political and democratic institutions, corruption is likely to be lower. So we include 'political rights' published by Freedom House as an additional regressor in the model. Cultural factors (Alatas et al., 2009) and social norms (Fisman and Miguel, 2007) have been found to have an impact on corruption. To capture these aspects, following the literature, we include proportions of Christians and Muslims in the total population as additional regressors (Swamy et al., 2001; Treisman, 2000).[9] Recent studies find that the colonial past (Swamy et al., 2001) and legal origin (Treisman, 2000) of a country may affect corruption in a country via its impact on economic and political institutions. Several studies find that former British colonies have better property rights, economic and political institutions, and more developed financial markets compared to former French, Portuguese, and Spanish colonies (La Porta et al., 1998; North et al., 2000). It is argued that a colonized country inherits the institutional set-up from its colonizer which is likely to persist.[10] Following this, we include a 'Former British Colony' dummy, and 'never colonized' dummy in the model.

2.2.3 Instruments

Recognizing that the women participation variables are potentially endogenous, we use an IV approach to establish causality. In our quest for valid instruments, we appeal to the recent

[9] Treisman (2000) argues that the objections raised against corrupt activities by office holders may be less in countries with a large proportion of population belonging to hierarchical religion compared to the countries where the population belonging to more egalitarian or socialistic religions such as Protestantism is higher. La Porta et al. (1997) classify Roman Catholic, Eastern Orthodox, and Muslim religions as hierarchical religions, and show that corruption is positively associated with hierarchical religions. They attribute this association to the lack of trust caused by the hierarchical structure. Due to the unavailability of data, we cannot control for the Catholic proportion. However, our objective is to capture the cultural aspects, and we find that our results are robust to the inclusion of the proportion of population belonging to other major religious faiths including Hinduism, Buddhism, Confucianism, and Atheism.

[10] Acemoglu and Robinson (2001) list three reasons why the institutions are unlikely to change. First, changing existing institutions are costly. Second, Europeans often delegated power to a small group of elite who may have an incentive to protect the existing extractive institutions set up by the former. Third, the irreversible investments made by the agents to complement the existing institutions will make them favor these existing institutions.

literature that reports a robust link between the grammatical structure of a language and various economic outcomes. For instance, Chen (2013) finds that languages that grammatically associate the present with the future are correlated with the speaker's health behavior and financial decisions, both within and across countries. We instrument women's presence in the labor force by a dummy variable that assumes a value 1 for the countries having a dominant language with two genders (masculine vs. feminine) and value 0 if the country's dominant language has either 0, 3 or more genders. Gender distinction is more pronounced, and hence, female participation in economic activities is lower in countries in which the dominant language has two genders as opposed to countries with dominant language having no gender or three or more genders (Gay et al., 2014). The gender marking of a language is, therefore, a valid instrument for the share of women in the labor force as there is no direct effect of this variable on corruption. Moreover, the gender marking of a country's dominant language has strong predictive power for women's presence in the labor force even after controlling for income, institutions and cultural variables making it a strong instrument for the share of women in the labor force.

We present our IV results of the impact of women's presence in parliament on corruption by experimenting with two potential instruments. Our first instrument is women's exposure to democratic rights as measured by the year when they were granted suffrage. The rationale for this instrument is that an early exposure of women to voting rights will affect women's presence in parliament today, while there is little reason to believe that an early voting rights to women will have a direct effect on corruption. We recognize that this instrument may not be perfect as in certain scenarios, the exclusion restriction may be violated. For instance, it is possible that institutions may affect voting rights which also have an impact on corruption. Furthermore, as aptly noted by Murray (2006a), in IV estimation, the omitted variable bias arises in a new form – IV estimates are biased if an omitted variable that belongs to the model is either correlated with other explanatory variables or with the instruments. To alleviate these concerns, we control for the likely sources of correlation between our instruments and

the error term by including cultural, historical and contemporaneous controls, as well as colonial and continent dummies.

Moreover, we employ a second instrument that allows us to check whether or not our instruments are valid, conditional on either one of the instruments being valid. Our second instrument, years since transition to agriculture, comes from a recent study (Hansen et al., 2012) that finds that the societies that have long agricultural histories have more unequal gender roles and lower participation of women in economic and political arenas including the labor force and parliament. This is a valid instrument as we find that years since transition to agriculture is indeed associated with lower participation of women in parliament, and at the same time, there is no reason to expect that it can affect corruption directly. Mauritius is the last country that adopted agriculture in our sample 375 years ago, while there are countries that adopted agriculture as early as 10,500 years ago.

Though our instrument for the share of women in the labor force is strong, our instruments for the share of women in parliament tend to be weak in some specifications which may lead to invalid inferences. To counter this possibility, we use the Conditional Likelihood Ratio (CLR) approach proposed by Moreira (2003) for hypothesis testing. Furthermore, while under homoskedasticity, the CLR test is the most powerful test for hypothesis testing in the presence of one endogenous variable and weak instruments, this result remains to be established for other IV-type estimators (Murray, 2006a; Finlay and Magnusson, 2009). Hence, we also report $p-$values for alternative approaches that provide robust inferences in the presence of weak instruments such as LM-J (a combination of Kleibergen-Moreira Lagrange Multiplier (LM) and the overidentification (J)-tests) (Kleibergen, 2002), and Anderson-Rubin (AR) tests (Anderson and Rubin, 1949) against the null that the coefficient of the instrumented variable, the share of women in parliament, is zero. In case of an over-identified equation, all these three statistics test both the structural parameters and the overidentification restrictions simultaneously by combining the LM statistic and J statistic, and provide inferences that are robust to the presence of weak instruments.

2.3 Cross-country results

2.3.1 OLS evidence

A. Women in the labor force and corruption

First, we investigate the relationship between the share of women in the labor force and corruption. The first column of Table 2.2 presents the result of the baseline specification with the variable of interest being the share of women in the labor force. The coefficient on the share of women in the labor force is negative and significant at the 5% level. However, when we include continent dummies in column 2, coefficient of the share of women in the labor force is no longer significant though it has expected sign.[11]

B. Women in potential bribe-taking positions and corruption

As shown in Table 2.2 (column 3), we do not find any significant association between the share of women in clerical positions and corruption which suggests that the bribe-taking role of women is not significant in determining the relationship between female participation in the labor force and corruption.

C. Women in decision-making positions and corruption

Next, we investigate whether decision-making ability allows women to impact corruption. This position captures both the bribe-giving and demanding role: While women in the positions of senior managers and officials are likely to be bribe-givers; women as legislators and senior government officials are likely to be bribe-takers. Hence, if women are less corrupt, we should observe a strong and negative association between this variable and corruption. We, however, find no association between the share of women in decision-making positions and corruption (column 4 of Table 2.2). We also do not find corruption to be significantly associated with either the share of women in clerical positions or the share of women in decision-making positions when continent dummies are added to the model (results omitted).

[11] Continent dummies are: Africa (the omitted category), Asia, Europe, North America, Oceania, South America, and Sub-Saharan Africa.

Table 2.2: Women and Corruption. Dependent Variable: Corruption Index

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of women in the labor Force	-0.0166**	-0.0103					-0.00828	-0.00639
	(0.00653)	(0.00656)					(0.00808)	(0.00845)
Share of women in clerical positions			0.00275					
			(0.00421)					
Share of women in decision-making positions				0.00461				
				(0.00708)				
Share of women in parliament					-0.0299***	-0.0300***	-0.0293***	-0.0296***
					(0.00477)	(0.00526)	(0.00524)	(0.00547)
Continent Dummies	No	Yes	No	No	No	Yes	No	Yes
Observations	154	154	91	91	120	120	113	113
Adjusted R^2	0.742	0.754	0.763	0.763	0.801	0.802	0.807	0.810

Heteroskedasticity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is negative of the Control of Corruption Index such that a higher value implies more corruption. All the specifications include baseline controls – log (GNPPC), political rights, proportion of Christians in total population, proportion of Muslims in total population, British colonial dummy, 'Never Colonized' dummy. Constant not reported.

D. Women in parliament and corruption

Finally, we investigate if women can have an impact on corruption by being in the role of policy makers. Consistent with the findings of the previous studies, we present evidence of a significant and negative association between the share of women in parliament and corruption. The coefficient of the share of women in parliament is found to be highly significant with the expected sign (column 5). Moreover, this relationship is robust to the inclusion of the continent dummies in column 6. Finally, column 7 controls for both the variables – women's share in the labor force and their presence in parliament. As we can see, the coefficient of the share of women in the labor force is very small and insignificant. On the other hand, the coefficient of women's participation in parliament remains significant. Results remain unchanged when continent dummies are added in column 8.

Notice that the regressions with women in decision-making positions and clerical positions as variables of interest have a considerably smaller sample size of 91 countries because of the data unavailability. It may be possible that the loss of observations in these regressions is non-random and the lack of significance is driven by sample selection. Table 2.3 restricts the analysis to only those countries for which data is available for all the women's participation variables and finds similar results except that women's share in the labor force now has a significant sign even when the continent dummies are controlled for. However, it loses significance in column 7 when both the share of women in parliament and the share of women in the labor force is included in the same specification. To be consistent with Table 2.2, continent dummies are added in column 8: the coefficient of the share of women in the labor force remains insignificant.

E. Inclusion of additional variables

Next, we control for a number of variables in order to minimize the possibility of omitted variable bias as well as to address the concerns of some of the previous studies that hypothesize that the relationship between female participation variables and corruption is spurious and is driven by the omission of relevant variables. These results are presented in Table 2.4.

Table 2.3: Women and Corruption (Restricted Sample). Dependent Variable: Corruption Index

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of women in the labor force	-0.0195*	-0.0241**					-0.0103	-0.0174
	(0.0112)	(0.0114)					(0.0105)	(0.0109)
Share of women in clerical positions			0.00115					
			(0.00580)					
Share of women decision-making positions				-0.00316				
				(0.00745)				
Share of women in parliament					-0.0328***	-0.0296***	-0.0315***	-0.0280***
					(0.00672)	(0.00821)	(0.00665)	(0.00817)
Continent Dummies	No	Yes	No	No	No	Yes	No	Yes
Observations	71	71	71	71	71	71	71	71
Adjusted R^2	0.788	0.810	0.779	0.779	0.847	0.850	0.847	0.854

Heteroskedasticity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is negative of the Control of Corruption Index such that a higher value implies more corruption. Regressions restricted to the sample of countries for which data is available for all women participation variables. All the specifications include baseline controls: log (GNPPC), political rights, proportion of Christians in total population, proportion of Muslims in total population, British colonial dummy, 'Never Colonized' dummy. Constant not reported. Sample restricted to the set of countries for which data is available for all the women's participation variables.

Liberal democracy: Sung (2003) argues that, in liberal democracies, women's participation is higher and corruption is lower, and it is the omission of the *liberal democratic institutions* variable that may be responsible for the relationship between female participation and corruption.[12] We address this concern by replacing the *political rights* variable with the *civil liberties index* published by Freedom House. It takes a value from 1 (high civil liberties) through 7 (low civil liberties) and is a broader measure of liberal democracy than political rights.[13] The index takes into account, among other things, the personal and social freedom of women including their choice of marriage partners and say in the family size. The coefficient of both the female participation variables remains significant when this variable is controlled for in columns 1 and 7.

Power structure and corruption: Different cultures have varied levels of tolerance for an unequal distribution of power. Hofstede's Power Distance Index (PDI) measures this tolerance providing a score in the range of 0 to 120, with the higher value indicating tolerance for a hierarchical order while a lower value implies that people strive to equalize the distribution of power.[14] We control for the PDI as an alternative measure of cultural differences among countries, and find that while women's share in parliament remains highly significant (column 8), women's share in the labor force is no longer significant (column 2).

Gender-biased institutions and corruption: It has been hypothesized that social institutions that discourage female participation in political and economic spheres are also more corrupt (Branisa et al., 2013). Hence, to address the concerns that our results may have been driven by the omission of gender-biased institutions, we control for the Social Institutions and Gender Index (SIGI). SIGI is a measure of gender inequality attributed to institutions and was first launched in 2009 by the Organisation for Economic Co-operation and Development (OECD). It is composite measure of five subindices – family code, civil lib-

[12] In a recent study, Esarey and Chirillo (2013) argue that women are more likely to conform to the political and institutional norms, and find evidence that the relationship between gender and corruption depends on the institutional context.

[13] For details on the differences between the two indices and how they are computed, visit Freedom House website: http://www.freedomhouse.org/report/freedom-world-2012/methodology.

[14] Visit http://geert-hofstede.com/dimensions.html for details.

erties, physical integrity, son-preference and ownership index. The family code is a measure of women's decision making power in the household on following issues – parental authority, inheritance, early marriage, and polygamy. Freedom of social participation of women including 'freedom of movement' and 'freedom of dress' is captured by the civil liberties sub-index. Note that this civil liberties index is different from the civil liberty index (discussed later) as published by the Freedom House. The 'violence against women' and 'female genital mutilation' are captured by the physical integrity measure. The sub-index son preference, as the name suggests, shows the preference for male child under scarce resources. It takes the value of the variable 'missing women' that reflects the gender bias in mortality. Finally, the sub-index ownership rights measures women's access to property and includes 'women's access to land,' 'women's access to bank loans,' and 'women's access to property other than land'. Further details regarding the construction of SIGI can be found in Branisa et al. (2009) and Branisa et al. (2013). Branisa et al. (2013) state that *"...we believe that the SIGI and its sub-components well capture gender inequality in social institutions which have previously not been adequately captured..."*.

The SIGI, thus, captures *"discriminatory social institutions, such as early marriage, discriminatory inheritance practices, violence against women, son preference, restricted access to public space and restricted access to land and credit."* The index takes a value from 0 to 1, with 1 representing high inequality. The inclusion of SIGI causes the share of women in the labor force to be close to zero and insignificant in column 3. The coefficient of the share of women in parliament, however, remains sizable and significant in column 9.

Schooling, ethnic division, and corruption: Columns 4 and 10 control for two additional covariates – 'proportion in largest ethnic group' and 'average years of schooling'. The proportion of the population belonging to the largest ethnic groups (*Ethnic*) is taken from Sullivan (1991). While the World Bank publishes data on schooling, the coverage of countries in Barro-Lee (Barro and Lee, 2013) data set is broader making it our preferred source for schooling data. We use average years of schooling (*Education*) data for the year

2010 as the Barro-Lee educational attainment data is available only for 5-year intervals. Our results are, however, robust when we use the proportion of the population with the secondary education or tertiary education, instead of the years of the average years of schooling attained by the population. Corruption may be higher in countries that are more ethnically divided, and lower in countries with higher human capital where people are aware of their legal and constitutional rights.

The negative relationship between women's participation variables and corruption is robust to the inclusion of these variables. Their coefficient of women's share in the labor force as well as parliament remains significant in columns 4 and 10 respectively. However, once we add continent dummies along with these variables, the share of women in the labor force loses significance (column 5), while the share of women in parliament remains statistically significant in column 11.

Openness to trade: It has been found that countries that are more open and have lower barriers to international trade are less corrupt (Ades and Di Tella, 1999; Treisman, 2000). Hence, we include the share of imports of goods and services in GDP as a measure of openness to trade. We take this data from the World Bank. We find that the share of women in parliament (column 12) is significant; while women's share in the labor force is not significant at conventional levels (column 6).

Notice that we have a smaller sample when the variable of interest is the share of women in parliament compared to the specifications in which the variable of interest is the share of women in the labor force. In order to rule out the concern that sample selection is responsible for the differences in the significance of the two variables, we re-run the regression specifications in columns 1-6 restricting the sample to the countries that are included in columns 7-12. The results are presented in Table 2.5 and are similar to those presented in columns 1-6 in Table 2.4 – the share of women in the labor force is significantly associated with corruption in columns 1 and 4 but is insignificant in columns 2, 3, 5 and 6.

Table 2.4: Women and Corruption. Dependent Variable: Corruption Index. Inclusion of Additional Variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Share of women in the labor force	-0.0137**	-0.00555	-0.000889	-0.0265***	-0.0131	-0.0147						
	(0.00642)	(0.0135)	(0.00795)	(0.00780)	(0.00851)	(0.00905)						
Share of women in parliament							-0.0296***	-0.0325***	-0.0264***	-0.0330***	-0.0291***	-0.0293***
							(0.00452)	(0.00708)	(0.00623)	(0.00494)	(0.00528)	(0.00557)
Civil liberty	Yes						Yes					
PDI		Yes						Yes				
SIGI			Yes						Yes			
Schooling				Yes	Yes	Yes				Yes	Yes	Yes
LEG				Yes	Yes	Yes				Yes	Yes	Yes
Openness						Yes						Yes
Continent Dummies	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Observations	154	61	92	114	114	112	120	48	62	85	85	84
Adjusted R^2	0.762	0.777	0.422	0.790	0.802	0.811	0.824	0.848	0.552	0.863	0.869	0.876

Heteroskedasticity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is negative of the Control of Corruption Index such that a higher value implies more corruption. All the specifications include baseline controls: $\log(\text{GNPPC})$, political rights, proportion of Christians in total population, proportion of Muslims in total population, British colonial dummy, 'Never Colonized' dummy. In columns 1 and 7, *political rights* variable has been replaced with *civil liberty*. Constant not reported.

Table 2.5: Robustness check: Women and Corruption (Restricted Sample). Dependent Variable: Corruption Index.

	(1)	(2)	(3)	(4)	(5)	(6)
Share of women in the Labor Force	-0.0197**	0.0133	-0.0119	-0.0271***	-0.0175	-0.0181
	(0.00829)	(0.0184)	(0.0115)	(0.00974)	(0.0117)	(0.0123)
Continent Dummies	No	No	No	No	Yes	Yes
Observations	113	48	62	85	85	84
Adjusted R^2	0.778	0.791	0.458	0.808	0.816	0.820

Heteroskedasticity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is negative of the Control of Corruption Index higher value implies more corruption. Regressions restricted to the sample of countries which are included in columns 7-12 in Table 2.4 in the main text. All the specifications include baseline controls: log (GNPPC), political rights, proportion of Christians in total population, proportion of Muslims in total population, British colonial dummy, 'Never Colonized' dummy. Constant not reported.

2.3.2 Establishing Causality: IV Analysis

In the last section, we find that the relationship between female participation in the labor force and corruption, though negative, is not robust. On the other hand, the relationship between the share of women in parliament and corruption was found to be negative and significant across different specifications. Although we control for a number of variables in the previous section, the possibility of endogeneity cannot be entirely ruled out in a cross-country OLS specification. We now use instrumental variable analysis in order to determine if gender representation has a causal impact on corruption.[15]

In the last section, we find that the relationship between female participation in the labor force and corruption though negative is not robust. On the other hand, the relationship between the share of women in parliament and corruption was found to be negative and significant across different specifications. Although we control for a number of variables in

[15]The IV estimates of the other two variables – the share of women in clerical positions, and the share of women in decision-making positions – using voting rights and transition since agriculture as instruments indicate that women's presence in these positions do not have an impact on corruption.

the previous section, the possibility of endogeneity cannot be entirely ruled out in a cross-country OLS specification. We now use instrumental variable analysis in order to determine if gender representation has a causal impact on corruption.[16]

A. Women in the labor force and corruption

Our instrument for the share of women in the labor force in a country is *the number of genders present in its dominant language*.[17] The lower panel of Table 2.6 reports the first stage results while second stage results are reported in the upper panel. In the first stage, the language variable is a significant predictor of women's share in the labor force across all specifications. The coefficient of the share of women in the labor force in the second stage has the expected negative sign, but it is not significant in column 1. It is also not found to be significant when we control for cultural variables, colonial dummies and a set of contemporaneous variables. In all these specifications, while the coefficient of the share of women in the labor force has the expected sign, in none of these columns, it is significant at conventional levels. Also, note that the instrument is strong in each specification as indicated by $F-$statistic in the columns of the bottom row of panel 1. Overall, the IV results convey the same story as OLS – while a larger share of women in the labor force seems to be associated with lower corruption, this relationship is not robust.

B. Women in parliament and corruption

Although we control for a number of variables to minimize the possibility of omitted variable bias, and find that the relationship between the share of women in parliament and corruption is robust, the concerns for reverse causality remains. It is possible that not only does women's presence in parliament affect corruption, but in corrupt countries women are

[16] The IV estimates of the other two variables – the share of women in clerical positions, and the share of women in decision-making positions – using voting rights and transition since agriculture as instruments indicate that women's presence in these positions do not have an impact on corruption.

[17] There are two dominant theories that trace the origin and evolution of language. The first theory credits the evolution of the grammatical structure to biological adaptation. The second theory considers languages as institutions that are shaped by a society's cultural heritage and links the emergence of grammatical structure to the cultural transmission of language to hundreds of generations of learners (for a review see Christiansen and Kirby, 2003).

Table 2.6: Women in the Labor Force and Corruption: IV estimates. Dependent Variable: Corruption Index

	(1)	(2)	(3)	(4)
	Second-stage regression. Dependent variable: Control of Corruption Index			
Share of women in the labor force	-0.00744 (0.0157)	-0.0137 (0.0225)	-0.0254 (0.0185)	-0.0211 (0.0190)
F-stat (excluded. inst.)	47.006	23.276	16.659	13.617
	First-stage regression. Dependent variable: Share of women in the labor force			
Number of genders = 2 in country's dominant language	-12.12*** (1.768)	-7.272*** (1.507)	-6.506*** (1.594)	-6.841*** (1.854)
Continent dummies	Yes	Yes	Yes	Yes
Cultural variables	No	Yes	Yes	Yes
Colonial dummies	No	Yes	Yes	Yes
Basline contemporaneous controls	No	No	Yes	Yes
Extended contemporaneous controls	No	No	No	Yes
Observations	125	120	98	84

Heteroskedasticity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Cultural controls: Proportion of Christians in total population, proportion of Muslims in total population. Colonial dummies: Former British colonies, Nvever colonized. Baseline contemporaneous controls: Log (GNPPC), average years of schooling. Extended contemporaneous controls: Political rights, proportion in largest ethnic group, openness to trade.

also discouraged from participating in politics.[18] If this is true, our OLS estimates will be biased. To address this issue, we use instruments for women's presence in parliament.

First, we present IV estimates by instrumenting women's participation in parliament with "the year women were granted voting rights". An initiative to include women in the political process should be positively correlated with their presence in politics and in national parliaments.

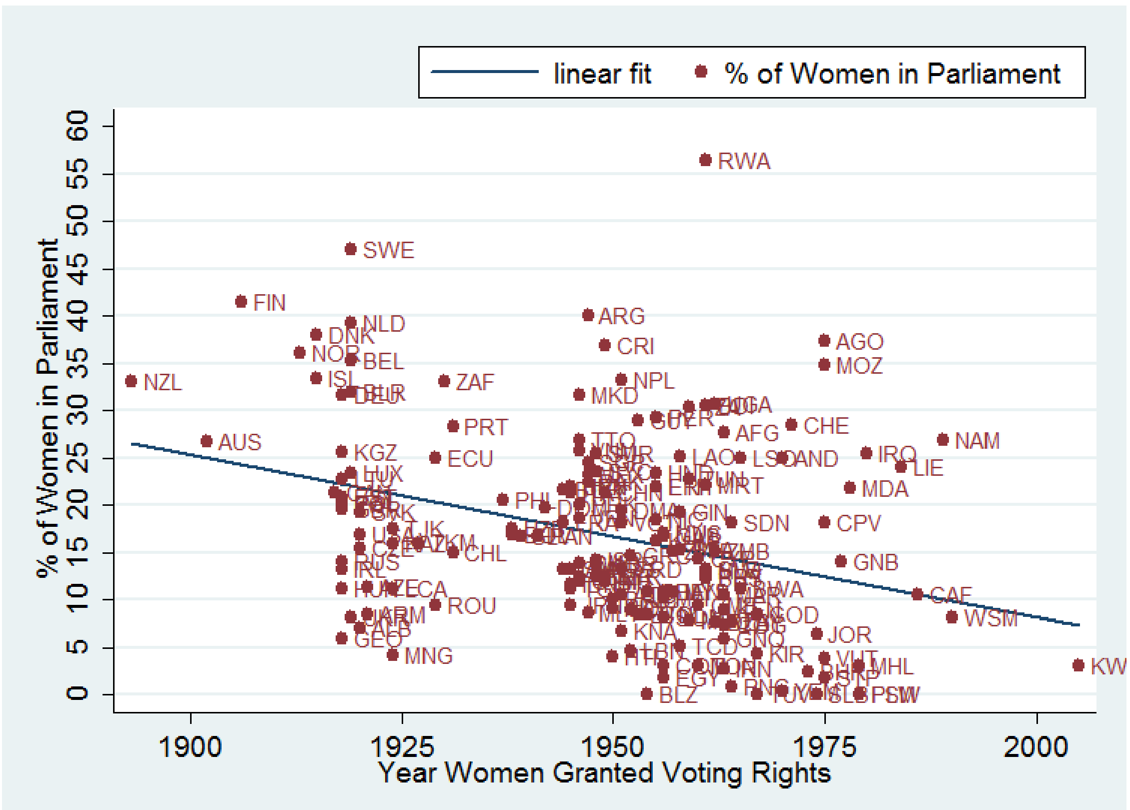


Figure 2.1: Voting Rights and Presence of Women in Parliament

Figure 2.1 shows a scatter plot of the association between the year women were granted suffrage and their presence in parliament. New Zealand is the first country to allow women to vote in 1893, and the State of Kuwait was the last country (in our sample) to grant voting rights to women in 2005.[19] However, there still might be some concerns about omitted

[18] Sundström and Wängnerud (2014) find that greater corruption is associated with lower political representation of women.

[19] The State of Kuwait granted voting rights to women on the condition that they observe Islamic laws. See the link for additional details, http://www.cnn.com/2005/WORLD/meast/05/16/kuwait.women/. This

variables in the IV regression. Hence, we discuss a number of potential factors from economics and political science studies that have explored the reasons leading to women being granted voting rights in different countries, and include these factors as explanatory variables in the empirical specification.

The timing of suffrage for women was affected by different factors throughout the world including threat of revolution, sociocultural factors, and the quality of institutions (Acemoglu and Robinson, 2000; Reynolds, 1999; also see Rule and Zimmerman, 1994). For example, Acemoglu and Robinson (2000) argue that the threat of revolution was the main contributing factor to political reforms and extension of voting rights to the poorer sections of the society in the West. In several countries like Germany and Sweden, this included women from the beginning. Another important determinant of enfranchisement of women is cultural factors. To the extent that cultural factors have an impact on corruption, our instrument will not satisfy the exclusion restriction if cultural factors are omitted from the model. However, since the proportions of Christians and Muslims in the total population are arguably exogenous to corruption (Treisman, 2000), we are able to control for this variable. Finally, it may also be institutions which may affect the timing of women being granted voting rights. Since institutions have also been found to impact corruption, exclusion of an institutional variable may lead to biased estimates. We address this concern by controlling for the colonial status of a country which is also exogenous to the level of corruption in a country. As argued above, colonial status of a country has important bearings on its institutions (see Acemoglu and Robinson, 2001).

In several countries in our sample, women were granted voting rights at the time the country got independence. So, in these countries there was no independent initiative to grant voting rights to women. However, our instrument is still valid due to the fact that as long as women got voting rights earlier (because of early freedom of a country from its colonizer) women's presence in the parliament will be higher. The concern, however, is that

underscores the impact of culture on voting rights for women which we address by controlling for the proportions of Christians and Muslims in the total population. We come to this issue later in the main text.

in these countries women's presence in parliament may also be capturing the impact of a change in democratic status of these countries since the independence year and women's participation in parliament are correlated. Since the year of independence of a country is exogenous, we control for the year of independence to rule out the possibility of any bias arising from this. Data for the year of independence has been taken from Acemoglu et al. who set any year before 1800 as 1800 (see Acemoglu et al., 2008 for details).

In panel 2 of Table 2.7, we present the first stage regression results. Consistent with our expectations, we find that women's presence in parliament is higher in countries where women were granted voting rights earlier. The coefficient of the "year women granted suffrage" in column 1 suggests that the presence of women in parliament in a country is about 1 percentage point less compared to a country that granted voting rights to women about 6 years earlier. Voting rights remains a significant predictor of women's share in parliament when we control for additional variables in columns 2, 3 and 4.

Panel 1 of Table 2.7 presents IV estimates obtained from the two-stage least squares (2SLS) regressions.[20] The specification presented in column 1 controls for cultural variables, colonial dummies and year of independence for the reasons discussed above. We also include continent dummies in order to rule out the possibility of any bias arising from the omission of continent fixed factors. The IV coefficient of the share of women in parliament is negative and highly significant in column 1. Column 2 controls for the contemporaneous variables – log (GNPPC), political rights, average years of schooling, openness to trade, and proportion in largest ethnic group. The coefficient of women in parliament from the second stage results indicates a strong and significant negative impact of this variable on corruption.

Columns 3 and 4 report the results with the instruments being the year women were granted voting rights and years since transition to agriculture. We control for a number of historical variables that may potentially be correlated with our instrument, transition to agriculture. In particular, we control for the use of plow, suitability of agriculture and the

[20] The point estimates obtained from using limited information maximum likelihood (LIML) are very similar to the 2SLS estimates.

presence of tropical climates. These variables are likely to have played a role in the adoption of agriculture (see Alesina et al., 2013 and Hansen et al., 2012). Moreover, we also control for the year of independence, colonial dummies, and continent dummies. Both, the voting rights variable as well as years since transition to agriculture, are significant predictors of women's presence in parliament, though, they are weak predictors as indicated by an $F-$ statistic of 4.32. Finally, in column 4, in addition to the historical controls, we also control for the cultural variables and a set of contemporaneous variables. The voting rights variable remains a significant predictor of women's presence in parliament, while the transition to agriculture is no longer significant, though, it has expected sign. In both the columns, the coefficient of women's presence in parliament is statistically highly significant. A concern, however, remains – it is possible that the null hypotheses in both these columns may have been falsely rejected because of the presence of weak instruments.

To overcome this concern, we report the CLR, AR and LM-J statistics, and 95% confidence sets based on the CLR approach using the methods discussed in Finlay and Magnusson (2009) that allow for robust standard errors.[21] In all our specifications, all the three statistics (the CLR and the AR in columns 1-4, and the LM-J in columns 3-4) reject the null hypothesis that the coefficient of women's presence in parliament is zero. Notice that though the Sargan-Hansen over-identification test fails to reject the null that our instruments are valid in both the columns (3 and 4), the J-statistic rejects the null that the instruments are valid in column 3, which could be because contemporaneous controls are not included. The $LM - J$ statistic, which combines the LM and J statistics, however, still rejects the null that the coefficient of women's share in parliament is zero at less than 5% level of significance. In column 4, however, when contemporaneous controls are added to the model, the J-statistic indicates that the instruments are valid with a p-value of 0.23.

[21] The Finlay and Magnusson (2009) Stata routine does not report the CLR statistic when there is only one instrumental variable. Since in case of an exactly identified equation, the CLR and AR statistics are equivalent (Murray, 2006b), in the first two columns, we report the 95% confidence sets and CLR $p-$values based on the AR statistics as reported by the *"rivtest"* (Finlay and Magnusson (2009)) command in Stata.

Table 2.7: Women in Parliament and Corruption: IV estimates. Dependent Variable: Corruption Index

	(1)	(2)	(3)	(4)
	Second-stage regression. Dependent Variable: Control of Corruption Index			
Share of women in parliament	-0.0627***	-0.0570***	-0.0907***	-0.0462***
	(0.0228)	(0.0185)	(0.0335)	(0.0135)
	[-0.111, -0.002]	[-0.112, -0.0196]	[-0.222, -0.047]	[-0.088, -0.013]
F-stat (excluded. inst.)	10.166	7.910	4.321	4.841
CLR (p-value)	0.0491	0.0108	0.0006	0.0156
AR (p-value)	0.0491	0.0108	0.0008	0.0263
LM-J (p-value)			≤ 0.05	≤ 0.05
$J-$stat (p-value)			0.0369	0.2327
Sargan $J-$stat (p-value)			0.2223	0.2494
	First-stage regression. Dependent Variable: Share of women in parliament			
Excluded Instruments				
Year women granted suffrage	-0.156***	-0.203***	-0.101*	-0.194**
	(0.0490)	(0.0722)	(0.0566)	(0.0826)
log(Years since transition to agriculture)			-4.382*	-4.349
			(2.238)	(3.161)
Controls				
Independence year	Yes	Yes	Yes	Yes
Continent dummies	Yes	Yes	Yes	Yes
Colonial dummies	Yes	Yes	Yes	Yes
Cultural	Yes	Yes	No	Yes
Contemporaneous	No	Yes	No	Yes
Historical	No	No	Yes	Yes
Observations	111	83	97	81

Heteroskedasticity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Figures in square brackets correspond to the 95% confidence sets based on conditional likelihood ratio (CLR) approach developed by Moreira (2003), and implemented by the Finlay and Magnusson (2009) Stata routine. The $p-$ values for the CLR, AR and LM-J statistics is against the null that the coefficient of the endogenous variable, *i.e.*, the share of women in parliament, is zero. $J-$statistic $p-$value reflects the over-identification test results with the null that instruments are valid. This $J-$statistic is evaluated at the null hypotheses, as opposed to Sargan-Hansen $J-$ statistic which is evaluated at the parameter estimate. Colonial dummies: British colony, never colonized. Cultural controls: Proportion of Christians in total population, proportion of Muslims in total population. Contemporaneous controls: log (GNPPC), political rights, average years of schooling, openness to trade, proportion in largest ethnic group. Historical controls: Plow use, agricultural suitability, tropical climate. Constant not reported.

The IV findings can be summarized as follows. First, the coefficient of women's presence in parliament is always highly significant in all the specifications, irrespective of the instruments used. Second, across all the specifications, the CLR statistic rejects the null that the coefficient of the share of women in parliament is zero. Third, the IV coefficients of women's share in parliament are always greater than the OLS coefficient reported in the previous section indicating that the OLS estimates of the effect of women's presence in parliament on corruption may be the lower bound.

2.3.3 Robustness Check

We limit our robustness checks to the two main variables of interest that have been found to be significantly associated with corruption in the previous section: the share of women in the labor force and the share of women in parliament.

Sensitivity to alternative measure of corruption

We check the sensitivity of our results with the use of an alternative measure of corruption, the Corruption Perception Index (CPI), published by Transparency International which defines it as "the misuse of public power for private benefit." It takes values in the range of 0 to 10, with a higher value indicating a lower level of corruption. We use negative of the CPI so that a higher number indicates higher corruption. CPI is created using data from different surveys conducted by a number of independent sources making it reliable and one of the most widely used indices in empirical corruption literature. In order to ensure reliability and robustness of the index, CPI ranks only those countries which are covered by a minimum of three different sources. Unlike CCI, in compiling the CPI all the sources are assigned equal weight. The surveys used in the compilation of the CPI are primarily of two types: opinion surveys of business men, and assessment scores assigned by a group of country, risk, or expert analysts.[22] While survey questions differ among several data

[22] The CPI method was developed by Johann Lambsdorff of the University of Passau. For the detailed methodology of computation of 2009 corruption perception index, visit http://archive.transparency.org/

sources, the objective of all the sources is to measure the prevalence of corruption as defined by Transparency International.[23]

The corruption perception indices (both the CCI and CPI) are often criticized on the grounds that they might be infected with the problem of circularity: While responding to survey questions, individuals' might "go with the herd" and their responses may be driven by the values of the past index. An advantage of using the CPI is that this hypothesis was tested and rejected in 2006 implying that the CPI reflects the perceptions which represent actual experience and not hearsay and, therefore, "the perceptions gathered are a helpful contribution to the understanding of real levels of corruption" (Lambsdorff, 2008; also see Lambsdorff (2007) for a discussion). The two indices, the CCI and CPI, have a correlation coefficient greater than 0.98 in the sample of countries used in this chapter. The high correlation between the two indices is not surprising following the fact that there are various common data sources in the computation of the two indices.[24]

Table 2.8 reports the results of the OLS, median, and robust regressions using CPI. These results are in agreement with our findings using the CCI – while the coefficient of women's presence in parliament is highly significant and negative regardless of the regression type and inclusion of the continent dummies (columns 3, 4, 6, and 8), the coefficient of the share of women in the labor force is not (columns 1, 2, 5, and 7). Moreover, corruption is not found to be significantly associated with the share of women in either clerical positions or decision-making positions and hence these results are not reported.

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policy_research/surveys_indices/cpi/2009/methodology.

[23] Some of the questions reflected in the 2009 CPI scores are following – "To what extent are there legal or political penalties for officeholders who abuse their positions?" "In your country, how commonly do the following firms (domestic and foreign firms) pay bribes to public servants or public officials?" "To what extent can the government successfully contain corruption?" "To what extent you agree that "Bribing and corruption" exist or not in the context of the country in which you work, and have resided for the past year, based on your previous international experience." Most of these questions ask respondents to assign a number in a given range, where a number is an indication of the extent to which the respondent agrees to the statement (question).

[24] For instance, some of the common data sources are: African Development Bank (Country Policy and Institutional Assessments), Asian Development Bank (Country Policy and Institutional Assessments), Bertelsmann Foundation, Economist Intelligence Unit, Freedom House, Global Insight, Political & Economic Risk Consultancy, World Economic Forum Global Competitiveness Report, and World Bank (Country Policy and Institutional Assessments).

Table 2.8: Women and Corruption. Dependent Variable: Corruption Perception Index.

	OLS Regression				Median Regression		Robust Regression	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of women	-0.0311	-0.00705			-0.0164		-0.0319	
in the labor force	(0.0199)	(0.0266)			(0.0294)		(0.0225)	
Share of women			-0.0775***	-0.0751***		-0.0865***		-0.0838***
in parliament			(0.0151)	(0.0159)		(0.0184)		(0.0138)
Continent Dummies	No	Yes	No	Yes	No	No	No	No
Observations	85	85	66	66	85	66	85	66
Adjusted R^2	0.775	0.779	0.859	0.867			0.751	0.865

In first 4 columns, Heteroskedasticity-robust standard errors in parentheses. In last 4 columns, standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is negative of Corruption Perception Index such that a higher value implies more corruption. All the specifications include balseline controls: $\log(\text{GNPPC})$, political rights, proportion of Christians in total population, proportion of Muslims in total population, British colonial dummy, 'Never Colonized' dummy. Constant not reported.

Ordered-probit estimation

Though the corruption indices used in this chapter are continuous variables they are bounded. Consequently the linear relationship estimated by ordinary least squares (OLS) may not be most appropriate in this context. Most of the papers in corruption literature, however, use OLS following the fact that corruption index is a continuous variable and *not* an ordering. Brunetti and Weder (2003) argue that OLS is an appropriate specification and perform ordered-probit regression only as sensitivity check. Note that the corruption index used by them takes discrete values, and hence, it could be argued that their dependent variable could be construed as an ordering.[25] On the other hand, the index we use is continuous and does not allow for such criticisms. Nevertheless, we check the sensitivity of our results using order-probit.

We divide our sample of countries in to 4 categories: very clean (category 1), clean (category 2), corrupt (category 3) and highly corrupt (category 4).[26] We assign these categories in the following manner. First, we divide countries in two groups – below mean *i.e.* below zero (relatively less corrupt countries), and above mean (relative more corrupt countries). Next we divide these groups into two sub-groups where there is a natural break in data points. Table 2.9 describes the assignment of categories and dummies, and the number of countries that fall under each category. We then perform an ordered-probit regression with the corruption variable defined as an ordering. In this context, ordered-probit estimation ensures that the corruption index does not exceed the maximum possible value (*i.e.* 2.5) for any country, when the variable of interest (such as the share of women in parliament) is very large. The results are presented in panel 1 of the Table 2.10. The results are similar to those obtained using OLS specifications – while the share of women in the labor force is

[25]The primary measure of corruption used by Brunetti and Weder (2003) is an indicator of corruption produced by the International Country Risk Guide (ICRG) that takes only discrete values in the range of 0 to 6. They use the average of the index, and use OLS specification. They argue that since corruption indices are based on numerical ratings and not on country ratings, corruption indices do not actually show the ordering (or ranking) of a country. See Brunetti and Weder (2003) for detailed discussion on why OLS is the most appropriate specification.

[26]There could be several other possible ways to define the ordering. We did check the robustness of the results under other classifications such as dividing the countries in 4 quartiles and found the similar results.

not significantly associated with corruption (columns 1 and 3), the coefficients of the share of women in parliament is significant in columns 2 and 4.

Table 2.9: Women and Corruption: Ordered-probit categories

Dummy assigned	Control of Corruption Index	Corruption Classification	Number of countries Column 1	Column 2	Columns 3 & 4
1	$CCI < -1.82$	Very clean	14	13	13
2	$-1.82 < CCI < 0$	Clean	39	40	35
3	$0 < CCI < 0.75$	Corrupt	61	42	40
4	$CCI > 0.75$	Highly corrupt	40	25	25

Please note that the CCI values in the Table is *negative* of the actual CCI. Columns 1, 2, 3, and 4 refer to the columns in Table 2.10.

Panel 2 of the Table 2.10 reports the marginal effects of change in regressors (only female participation variables reported) computed at their means for specifications in columns 1 and 2. If our hypothesis is correct, then a higher level of female participation should be associated with a higher probability of being in clean categories, and hence the marginal effect is expected to be positive for the first categories, and should change sign as we move from very clean to highly corrupt. This is exactly what panel 2 shows. While the marginal effect is consistent with the hypothesis for both the female participation variables, it is not significant for the share of women in the labor force variable for any of the four categories. For the share of women in parliament, however, the marginal effect is positive in first two columns, and is highly significant for category 2 indicating that countries which have a higher presence of women in parliament, are more likely to be in "clean" category. In the last two columns, marginal effect is negative and statistically significant indicating that countries, where the share of women in parliament is higher, have the lower probability to fall in "high corruption categories" (categories 3 and 4).

Table 2.10: Panel 1: Women and Corruption. Dependent Variable: Corruption Index

	Panel 1: : Ordered-probit estimates.			
	(1)	(2)	(3)	(4)
Share of Women in the Labor Force	-0.0139		-0.0158	
	(0.0161)		(0.0184)	
Share of Women in Parliament		-0.0789***		-0.0809***
		(0.0142)		(0.0150)
Observations	154	120	113	113
Pseudo R^2	0.434	0.550	0.458	0.546
	Panel 2: Marginal effects evaluated at the mean			
	Category 1 (Very clean)	Category 2 (Clean)	Category 3 (Corrupt)	Category 4 (Highly corrupt)
Share of women in the labor force	0.0000558	0.0042465	-0.0023942	-0.001908
	(0.0000777)	(0.0049845)	(0.002975)	(0.0021742)
Share of women in parliament	0.0000451	0.0312035***	-0.0290816***	-0.002167*
	(0.000063)	(0.0056669)	(0.0058838)	(0.0012644)

Panel 1: Heteroskedasticity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Countries have been divided in 4 catogeries in the Control of Corruption Index. Each category has been assigned a dummy – very clean (1), clean (2), corrupt (3) and highly corrupt (4). Dependent variable is the dummy assigned to each category. Columns 3 and 4 present the results of the same set of countries for both the variables of interest in order to check if the differences in the significance for our variables of interest is driven because of sample issues. All the specifications include baseline controls: log (GNPPC), political rights, proportion of Christians in total population, proportion of Muslims in total population, British colonial dummy, 'Never Colonized' dummy. Constant not reported.
Panel 2: Delta method standard errors in parentheses. Marginal effects reported here correspond to columns 1 and 2 of Table 2.10

Table 2.11: Women and Corruption (Median and Robust Regression). Dependent Variable: Corruption Index.

	Median Regression				**Robust Regression**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of women in the labor force	-0.0137**	-0.00732			-0.0109*	-0.00607		
	(0.00667)	(0.00803)			(0.00603)	(0.00660)		
Share of women in parliament			-0.0275***	-0.0295***			-0.0305***	-0.0306***
			(0.00538)	(0.00647)			(0.00432)	(0.00463)
Continent Dummies	No	Yes	No	Yes	No	Yes	No	Yes
Observations	154	154	120	120	154	154	120	120
Adjusted R^2					0.779	0.789	0.838	0.839

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is negative of the Control of Corruption Index higher value implies more corruption. All the specifications include baseline controls: log (GNPPC), political rights, proportion of Christians in total population, proportion of Muslims in total population, British colonial dummy, 'Never Colonized' dummy. Constant not reported.

Median and robust regressions

The least squares estimators are sensitive to outliers especially in the small samples. A class of robust estimators which are less sensitive to the presence of outlying observations such as least absolute deviations (LAD) estimators might, therefore, be preferable in small samples. The median regression is a type of LAD estimator and is a robust alternative to the least squares regression. See Greene (2012) for a discussion on robust estimator.

Table 2.11 presents the results of median and robust regressions.[27] The advantage of these regressions is that the coefficient estimates are not affected disproportionately due to the presence of outliers. As we can see, the coefficient of the share of women in the labor force is significant at conventional levels in column 1 (median regression) and column 5 (robust regression) but loses significance once continent dummies are added to the model (columns 2 and 6). On the other hand, the coefficient on the share of women in parliament is always significant at conventional levels (columns 3, 4 and 7, 8).

2.4 Sub-national evidence

Our IV results show a robust and negative relationship between women's share in parliament and corruption. However, there may still be a concern that there could be some country-specific fixed factors that are associated with both a higher participation of women in government as well as lower corruption and it is these factors that may be driving the relationship between the two. Although this seems to be less likely, as a means to bolster our results further, we provide sub-national evidence from 17 European countries covering 155 regions.

The advantage of this exercise is manifold. First, the European countries constitute a relatively homogeneous sample compared to the world sample. Second, this analysis allows

[27] The robust regression, as performed by "rreg" command in stata 12, drops the influential observations (Cook's distance > 1), and performs the Huber iterations. It also down-weighs the observations with large absolute residuals (Introduction to STATA. UCLA: Statistical Consulting Group. from http://www.ats.ucla.edu/stat/stata/dae/rreg.htm accessed March 22, 2013).

us to control for the country fixed effects ruling out the possibility that our results are driven by the omission of country fixed factors. Finally, the measure of corruption used in this exercise is *actual corruption* instead of perceived corruption and hence is free from the criticisms that perception indices are subjected to. The corruption or bribery data comes from the European Quality of Government Index (EQI).[28] The first round of the EQI survey was conducted in 2010 covering 172 regions of 28 member states of European Union and surveyed 34,000 citizen respondents in December 2009 (Charron et al., 2011). Our corruption measure is the response to the following question of the 2010 EQI survey:

> *In the past 12 months have you or anyone living in your household paid a bribe in any form to:*

1. Education services?
2. Health or medical services?
3. Police?
4. Any other government-run agency?

The response "yes" is coded as 1 and "no" is coded as 2, and the percentage of population having paid a bribe is calculated. This number is then standardized with the mean 0 and standard deviation 1 such that a higher value indicates lower bribe experience. We use the negative of the index such that a higher value implies a greater bribery experience. Sundström (2013) has collected data on women's political representation at the lowest administrative tier. The unit of analysis in this section is NUTS 2 (the Nomenclature of Territorial Units for Statistics) – a standard developed by the European Union for subdivisions of countries for statistical purposes. Data for the regional controls by NUTS 2 region (income per capita, the share of women in the labor force, and proportion of the population aged 25-64 with tertiary education attainment) are from Eurostat. Table 2.12 provides the results of the European regional analysis.

[28] The EQI data (2013) has been used by some of the recent studies to explore gender differences (for example, Agerberg, 2014) and the association between corruption and women's participation in politics (Sundström and Wängnerud, 2014).

Table 2.12: Women and Corruption: Sub-national Evidence.

	(1)	(2)	(3)	(4)	(5)	(6)
Share of Women in the labor force (regional)	-0.0683***		-0.0369	-0.0350		-0.0317
	(0.0247)		(0.0288)	(0.0317)		(0.0305)
Share of Women in local govt.		-0.0313***	-0.0144*		-0.0126*	-0.0121*
		(0.0119)	(0.00793)		(0.00672)	(0.00648)
Share of Women in the labor force (national)			-0.0864**			
			(0.0410)			
Share of Women in parliament			-0.0459***			
			(0.00789)			
Regional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes	No	No	No
Country Fixed Effects	No	No	No	Yes	Yes	Yes
Countries	17	17	17	17	17	17
Observations	155	155	155	155	155	155
Adjusted R^2	0.584	0.615	0.716	0.824	0.827	0.828

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. A higher value of the dependent variable indicates the higher corruption. Regional controls: log(GDPPC), education. Country Controls: log (GNPPC), political rights. Constant not reported. Countries included in this analysis are: Austria, Belgium, Bulgaria, Czech Republic, Denmark, France, Germany, Hungary, Italy, Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden, and United Kingdom.

In the first 3 columns of Table 2.12, instead of controlling for the country fixed effects, we control for country-level variables – income and political rights along with the regional variables – income levels and the education. In the first two columns, a higher share of women in the labor force and a higher share of women in local government are found to be negatively associated with bribe experiences of citizens. Column 3 controls for the share of women in parliament and the national share of women in the labor force. While women's participation in politics at both levels, local and national, is associated with lower corruption, only women's share in the national labor force is found to have a negative association with corruption. The results, however, may have been driven by the omission of the country fixed factors. In order to rule out this possibility, we include continent dummies in the next 3 columns. While the share of women in local government is still negatively associated with corruption, the association between the share of women in the labor force and corruption disappears once country fixed factors are controlled for. Our analysis of 17 European countries, thus, suggests that the effect of women's presence in politics on corruption is not driven by country-specific fixed factors and that the relationship between the women's political participation and corruption is indeed causal.

2.5 Will the relationship between gender and corruption disappear as women become more equal?

In this section, we explore the notion of "corruption convergence in gender", that is, whether women's participation in corrupt activities will be no different from that of men as they become similar to men in their social status. This could be one possible explanation since none of the previous studies claim that women are inherently less corrupt or that the observed gender differences in attitude towards corruption are permanent or biological. Ideally, this issue should be investigated using a panel specification, but as mentioned earlier, this is not feasible when using corruption indices. Hence, we devise an alternative approach to deal with this problem.

As discussed in the introduction, several studies have suggested that the observed gender differences in attitude towards corruption could be the result of gender differences in social status or women's lack of knowledge regarding how to engage in corrupt activities or their ability to make decisions relating to corrupt activities or even for that matter being given access to corrupt activities. For instance, Goetz (2007) gives the example of Peru where the salary of traffic cops is insufficient to maintain a family. She observes that while men as traffic officers accept bribes, this is not yet the case for women. However, doubting that this will persist in the long run, she writes *"...women will not passively conform to the idealized notions of their finer moral nature when they have families to feed and if there is money to be made from public office."*

Consequently, one possibility is that there would be no difference in corrupt behavior between men and women if women held similar status as men. We capture this issue by using the Gender Inequality Index (GII) computed by the United Nations Development Programme (UNDP) as a measure of the status difference between genders. The index can take a value in the range of 0 (implying more equal gender-status) to 1 (when gender-gap is large). The GII is calculated by the United Nations Development Programme (UNDP). It is a broader measure of gender-gap than educational attainment gap, or life expectancy gap across genders. According to UNDP *"the Gender Inequality Index is designed to reveal the extent to which national achievements in these aspects [reproductive health, empowerment and the labor market] of human development are eroded by gender inequality, and to provide empirical foundations for policy analysis and advocacy efforts."* The health dimension controls for the maternal mortality rate and the adolescent fertility rate. Essentially there are no male-equivalent indicators for reproductive health, as a result the ideal social goals – no maternal death and no adolescent pregnancy, are taken as comparison points. The secondary and higher educational attainment, and the share of each sex in parliament is included in the empowerment dimension. Women's participation in the work force is used as a measure

of labor dimension.[29] Annual data for the gender inequality index, however, is not available, and hence we use the 2008 gender inequality index in all our regressions.

Now, if the hypothesis of "corruption convergence in gender" were true implying that women will become as corrupt as men with equality of status, then the interaction term between the GII and female participation variables must assume a negative coefficient in Table 2.13 – as equality of status increases (or GII decreases), corruption must go up.

However, we find exactly the opposite result – the coefficient of the interaction term is positive and significant in all the four columns. In other words, the relationship between gender and corruption is not driven by gender differences in social status. This finding is in contrast with the hypothesis of "corruption convergence in gender".[30] However, we cannot rule out the possibility of endogeneity in this section, and these findings should be treated as suggestive evidence. Clearly, there is a need for further research on this topic.

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[29] There are, however, some data limitations with the GII. For instance, the data is very limited on a number of variables that indicate gender inequality including but not limited to – the participation of women at the local government level, information on incomes, employment and unpaid work by women, women's ownership of assets, and violence against women. For more details, visit UNDP's website: http://hdr.undp.org/en/statistics/gii/

[30] This finding is also in line with the hypothesis that women's presence in parliament affects corruption via policy effects. In countries where women actually have a say in policy making rather than just being a member of a parliament with no actual power, women are more likely to be successful in lobbying for the policies they deem necessary, and hence, a bigger effect on corruption. Nevertheless, we cannot rule out other explanations, and therefore, this finding must be interpreted with caution and requires further investigation.

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Table 2.13: "Corruption Convergence in Gender?" Dependent Variable: Corruption Index

	(1)	(2)	(3)	(4)
Share of women in the labor force	-0.0253***	-0.0214***		
	(0.00771)	(0.00725)		
Share of women in the the labor force × GII#	0.0217**	0.0554***		
	(0.00984)	(0.0129)		
Share of women in parliament			-0.0442***	-0.0483***
			(0.00618)	(0.00682)
Share of women in parliament × GII			0.0402**	0.0687***
			(0.0172)	(0.0215)
Continent Dummies	No	Yes	No	Yes
Observations	124	124	95	95
Adjusted R^2	0.786	0.824	0.870	0.885

Heteroskedasticity-robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is negative of the Control of Corruption Index higher value implies more corruption. #GII = Gender Inequality Index. All the specifications include baseline controls: log (GNPPC), political rights, proportion of Christians in total population, proportion of Muslims in total population, British colonial dummy, 'Never Colonized' dummy. Constant not reported.

that we cannot rule out the possibility of endogeneity in this section, and these findings are just suggestive evidence – an acceptance or rejection of this hypothesis calls for the need of further research.

2.6 Concluding remarks

In investigating the role in which women can affect corruption, this chapter finds that women's presence in the labor force, in clerical positions, and in decision-making (senior-level) positions is not significantly associated with corruption in a country. We show that women are able to have a systematic negative impact on corruption only if they are represented in parliaments and possibly through policy making. We use instruments to establish causality, and draw inferences based on the conditional likelihood ratio approach proposed by Moreira (2003), Anderson-Rubin Statistic (Anderson and Rubin, 1949), and $LM-J$ statistic (Kleibergen, 2002). Our results are also shown to hold in a regional analysis of European countries where after controlling for the country fixed effects, we find that women's share in the local government is associated with lower bribery. Finally, our results also suggest that observed gender differences in corruption are not entirely be driven by gender differences in social status.

Our analysis also raises one question for future research – how do women reduce corruption by being in politics? One possible answer could be that they favor policies that are different from those favored by men. The recent literature has extensively explored the policy implications of gender representation in government. Women in local government in India have been reported to allocate a greater budget to public goods more closely associated with women's concerns (Chattopadhyay and Duflo, 2004), to the provision of basic infrastructural needs, and to be more concerned about whether the subsidies were provided to the targeted group without corruption (Kudva, 2003). Moreover, the female political representation has also been found to be positively associated with the state health spending (Rehavi, 2007) and

explanations, and therefore, this finding must be interpreted with caution and requires further investigation.

educational outcomes Clots-Figueras, 2011.[32] The political science literature also documents that women in the government tend to introduce and pass more bills that are concerned with the welfare of women, children and families (Thomas, 1991), advocate women's right issues more strongly than men, and participate more frequently in debates on bills that address issues of women, children and the family than debates on other bills (Taylor-Robinson and Heath, 2003).

At the same time, there are also studies which show that education reduces corruption. For instance, Glaeser and Saks (2006) find that corruption, as measured by *"the number of government officials convicted for corrupt practices through the Federal justice department"*, is less in more educated states in America. Moreover, our findings also refute the hypothesis that the observed gender differences in the attitude towards corruption is entirely due to gender differences in social status and will disappear over time when women acquire more equal socio-economic status. Indeed if women have distinct preferences for policies that are different from that of men and if policy-making is the channel through which women in government affect corruption, then there is little reason to think that the association between women's presence and corruption will vanish as they get similar as men in social status. Clearly this question bears further investigation.

To sum up, gender inequality is still persistent around the globe. The gender gap exists in access to education, work and participation in economic and political activities. In the Millennium Development Goal Report (2012), United Nations recognizes the importance of women's empowerment for achieving its goals. The findings of this chapter suggest that women's participation in politics should not only be encouraged for the sake of obtaining gender equality but also because it has positive externalities – a negative impact on corruption.

[32] Rehavi (2007) finds that the share of women in state houses in the US states is positively associated with the state health spending. Clots-Figueras (2011) finds that the probability an individual will attain primary education in urban areas in India is positively associated with female political representation.

Chapter 3. Does Facebook Reduce Corruption?

3.1 Introduction

In recent years, the role of "liberation technology"[1] like the internet, mobile phones and social media in empowering individuals, increasing their participation in the political process, facilitating communication and mobilization on social issues, and strengthening an emergent civil society has been widely recognized (Diamond, 2010; Saleh, 2012). It has been shown that greater access to information is negatively associated with the level of corruption in a country (DiRienzo et al., 2007).[2] In fact the first paper in this vein by Brunetti and Weder (2003) argues that a free press reduces the cost of fighting corruption and shows that the countries, where the press enjoys greater freedom, are less corrupt.

Traditional media (print and broadcast media) only provides the possibility of one-way communication and has often been subject to censure and control by authoritarian regimes, typically either through monopolizing or by regulating the print and broadcast media. Clamping down or controlling digital media is much more difficult since they allow for multi-way communication of information. Indeed, the spread of internet and the social media challenged the monopoly of authoritarian governments on information by making it easily available to the public, and even leading to a regime change in some instances.[3] Inspired by such facts, this chapter explores the possibility that the increasing use of social media, particularly Facebook, may have a negative impact on corruption.

[1] The term liberation technology comes from Diamond (2010) who defines it as "any form of information and communication technology (ICT) that can expand political, social and economic freedom".

[2] Islam (2006) develops a transparency index and shows that the quality of governance is positively associated with the transparency index and the access to information index.

[3] Often cases of corruption, human rights violations and police brutality have been taboo subjects for citizens and have been censored in a number of countries such as China, Malaysia and Iran.

There are a number of channels through which social media and Facebook penetration can help reduce the cost of fighting corruption. First, a larger number of social media users would mean a larger audience for the victims of extortive corruption that wish to share a corruption related incident. Second, social media provides cheap and speedy means of sharing information and reaching a larger audience to organize public protests against the corrupt activities of government officials and politicians.[4] Social media also plays a complementary role and augments the effect of a free press (traditional print and broadcast media) on corruption since a larger proportion of the population using social media would result in information from a free press reaching a larger proportion of the population. Finally, interaction in social media platforms is typically among friends and family and this personal touch to information may give it more credibility. In fact, individuals might feel more compelled to act on such information just to show solidarity with their near and dear ones. Taken together, all of these factors suggest that it is important to study the impact of these multi-way channels of communication on corruption.

Studies exploring the effect of communication technology, particularly social media, on corruption are scarce. The impact of internet on corruption, though limited, has at least been studied and we briefly review the related literature at the end of this section). One of the biggest obstacles to studying the effect of social media on corruption is to obtain data for social media users which is often difficult, especially for developing countries. In addition, there are two important factors behind the scarcity of these studies – first, the lack of variation in corruption indices over time; and second, concerns about endogeneity and the lack of a valid instrument. The former makes a panel analysis of studies regarding corruption almost impossible, exacerbating the concerns for endogeneity. Furthermore, Facebook

[4] A victim of extortive corruption may share the corruption incident on social networking sites to mobilize support for the fight against corruption. For instance, an Indian non-government organization, *"Janaagraha"* runs a website where people can share their detailed experience regarding corruption, and uses the information "to argue for improving governance systems and procedures, tightening law enforcement and regulation and thereby reduce the scope for corruption in obtaining services from the government". The website address is: http://www.ipaidabribe.com/. A Facebook page called *"India Against Corruption"* was used by social activists in India to mobilize protests against corruption.

penetration can be endogenous to corruption, primarily because of internet penetration. If internet penetration is not controlled for, an omitted variable bias arises and the coefficient of Facebook penetration will be biased upwards. On the other hand, internet penetration itself is endogenous to corruption and inclusion of this variable in the model introduces endogeneity. For example, a corrupt government might discourage investment in the adoption of technologies that could have an adverse impact on corruption and/or restrict freedom on the net.[5]

If any such action results in a lower internet penetration, it automatically means that Facebook penetration will also be lower. Under these circumstances, the ordinary least squares (OLS) estimates will be biased, and hence, an exogenous instrument for the internet penetration is required. However, once people decide to get an internet connection (under given regime), the decision regarding whether to be a member of the social media websites will be contingent on factors other than the freedom regarding what (anti- or pro- government) stories can be shared on social media platforms. In fact recent studies (Cha, 2010; Sago, 2013) show that the determinants of social media usage include include age (young people use social media websites more often), privacy concerns, perceived ease of use, internet experience, the interpersonal utility motives, enjoyment, and the perceived usefulness . Hence, once internet penetration is instrumented, the coefficients of both, Facebook penetration and internet penetration, will be consistent and unbiased.

Since data for the number of social media users is not available, we use Facebook penetration as a proxy for social media. The data was obtained from *'Quintly'*, a social media benchmarking and analytics solution company, and investigates the relationship between Facebook penetration and corruption.[6]

[5] For instance, Collier and Hoeffler (2005) show that corruption reduces infrastructure investment and the quality of infrastructural services, limits access to infrastructure facilities and increases the cost of providing infrastructural services. We will discuss the issue of freedom on the net later in the empirical specification.

[6] The data was accessed from its website (http://www.quintly.com/facebook-country-statistics?period=1year) on May 10, 2013. The data is no longer publicly available and has to be purchased now.

We address endogeneity concerns regarding corruption and social media usage by using a newly constructed variable on historical technological adoption from the Cross-country Historical Adoption of Technology (henceforth, CHAT) dataset (Comin and Hobijn, 2009). There is considerable cross-country variation in technology adoption in 1500 AD. Comin et al. (2010) compute indices of technology adoption in 1500 AD in five different sectors – agriculture, transportation, military, industry and communication. In spite of the crudeness of this measure, the authors find that there is a positive and significant association between these indices and technology adoption today. It is important to note that the relationship is found to be robust at sector level even after controlling for factors like institutions. Comin et al. (2010) discuss numerous reasons to explain the persistence of technological differences since 1500 AD. These include but are not limited to the lower cost of and higher benefits from the adoption of new technologies resulting from the complementarity between the existing and new technology, cross-sectoral technological spillovers, lower cost of innovation and adoption, economies of scale, economies of scope of general purpose technologies, learning by doing and using a combination of old technologies to make new ones (see Comin et al. (2010) and references therein).

We exploit the variation in cross-country communication technology adoption in 1500 AD, and its association with technology adoption today to identify the impact of Facebook penetration on corruption. Specifically, we use technology adoption in communication in 1500 AD as an instrument for internet penetration (technology adoption) today.[7] We now briefly review the existing literature to explain the contribution of this chapter.

This chapter follows a rich existing literature studying corruption across countries. In his seminal work, Treisman (2000) identifies several factors that determine the level of (perceived) corruption in a country. The findings of his chapter suggest that countries with Protestant traditions, long democratic exposure and British colonial histories are less cor-

[7] There is another advantage of using this instrument over the instrument used by some of the previous studies like lightning strikes or other weather-related variables. A sizable number of users access social networking sites on cellphone which is not affected by lightning activity or weather.

rupt. In another significant paper, Brunetti and Weder (2003) investigate the impact of the press freedom on corruption. They classify press freedom as an external mechanism to control corruption – a control exercised by individuals or organizations that are outsiders to the network of corruption, *i.e.* the bureaucratic system. They argue that press freedom puts a check on corruption by reducing the cost of fighting corruption.[8] Using Hausman and Taylor's technique, Elbahnasawy and Revier (2012) study the effect of both, time-variant and time-invariant factors on corruption and find that while the rule of law, perception of free expression and accountability, and free media reduce corruption, factors such as natural resource abundance, religious tradition, political stability, and ethnic fractionalization do not matter for corruption.

Goel et al. (2012) show that greater internet awareness regarding corruption is associated with lower corruption across countries using internet searches for corruption (such as "corruption", "bribery" and "country name") on Google and Yahoo as the measure of internet awareness. Andersen et al. (2011), using lightning activity as an instrument for internet diffusion, show that internet penetration is negatively related to corruption. Using dynamic panel data model to address endogeneity concerns, Elbahnasawy (2014) finds that a greater use of e-government and greater internet adoption are associated with lower corruption.[9] Continuing in this vein, the present chapter explores the impact of Facebook on corruption. To the best of our knowledge, this chapter is the first comprehensive study to quantify the impact of social media on corruption.

Our results show that Facebook penetration has a causal and negative impact on corruption. We address the endogeneity concerns by instrumenting internet penetration with the 1500 technology adoption in the field of communication. We show that our instrument

[8] According to Brunetti and Weder a free press is especially more effective in fighting collusive corruption where the internal controls of corruption – the agencies that control corruption within bureaucracy – are likely to be less effective. See Brunetti and Weder (2003) for an excellent discussion of the two kinds of corruption and how a free press is an effective tool against these kinds of corruption.

[9] An important caveat of this study must be kept in mind while interpreting the results. Transparency International, the publisher of Corruption Perception Index, the corruption measure used in this study, warns that these indices are not comparable across time prior to 2012. See http://www.transparency.org/files/content/pressrelease/2012_CPIUpdatedMethodology_EMBARGO_EN.pdf for details.

is strong even when we control for a number of institutional, cultural, historical, and contemporary variables that might potentially be correlated with past and present levels of corruption and/or past and current levels of technology adoption. Moreover, we perform a variety of robustness checks on Facebook-corruption relationship including a falsification test that confirms that this relationship is causal. We find that while there is no association between Facebook penetration and corruption index prior to the launch of Facebook, there is a mild association between Facebook penetration and corruption index 2 years after Facebook was introduced and that this association becomes much stronger in 2011 (8 years after the inception of the Facebook). Consistent with the findings of the previous studies, we also find that internet penetration is negatively related with corruption.

The rest of the chapter is organized as follows. In the next section, we briefly describe our data sources. Section 3 outlines the empirical strategy. In sections 4, we present OLS and IV results. Section 5 presents robustness checks and falsification test of the Facebook-corruption relationship and section 6 concludes.

3.2 Data and empirical strategy

3.2.1 Data

This chapter uses the 2011 Control of Corruption Index (CCI) published by the World Bank as the primary measure of corruption (*Corruption*).[10] Kaufmann et al. (2011) describe the objective of the CCI as – "capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests." The CCI takes values in the range of -2.5 to 2.5, with -2.5 representing the most severe corruption and 2.5 representing the lowest

[10] The results are robust to the use of an alternative measure of corruption – the 2011 Corruption Perception Index published by Transparency International that defines corruption as "the misuse of public power for private benefit".

level of corruption.[11] The data source for our variable of interest, Facebook penetration, is *Quintly,* a social media benchmarking and analytics solution company. *'Quintly'* uses the Facebook advertising tool in order to collect data on Facebook users in different countries. Even though the advertising tool belongs to Facebook, *Quintly* data has to be interpreted carefully since Facebook claims that these data are not completely accurate. The official number of Facebook users may be slightly different from the number of Facebook users indicated by this advertising tool. For example, Facebook reported 1.11 billion users at the end of March, 2013 while the number of users reported by the advertising data was 965 million, or a difference of roughly 13 percent indicating that "[this] advertising data can be seen as rough estimates for the Facebook country statistics. No more, no less." (Nierhoff, 2013).

The data source for our instrument is Comin et al. (2010) who use a number of historical sources of information to compute an index of cross-country technology adoption in 1000 BC, 0 AD, and 1500 AD. They note that 1500 AD data is more precise because of a large number of sources documenting the technology adoption patterns. Since internet is a part of communication technology, our instrument is technology adoption in communication. Note that Comin et al. (2010) take care to ensure that this measure does not incorporate technology transferred by Europeans to the rest of the world. The construction of communication index uses four variables – 'the use of movable block printing', 'the use of woodblock printing', 'the use of books' and 'the use of paper'. Comin et al. (2010) find that this is a good predictor of technology adoption today even after controlling for a number of variables like geographical and institutional factors. This index is created on the basis of the extensive margin of technology adoption and not the extent to which these technologies were used (i.e. intensive margin) and takes a value between 0 and 1.[12]

[11] Further details about the CCI can be found in the data section of Chapter 2.

[12] The construction of this data takes into account the fragmentation and unification of countries subsequent to the period to which the data belongs. Interested readers may refer to Comin and Hobijn (2009) and Comin et al. (2010) for the details about the methodology of constructing the index and the sources of information that have been used to construct these indices.

We use Gross Domestic Product (GDP) as a measure of income. The data for GDP per capita ($\log(GDPPC)$) and internet penetration have been taken from the World Bank. Freedom House publishes data on political rights ($Pol\,Rights$) and press freedom ($Press$). The political rights index can take a value from 1 through 7, with a lower value representing better political rights. A very high rating such as 7 would imply that political rights of the citizens are severely compromised. Such countries may be characterized by severe government oppression, absence of a functioning central government and widespread extreme violence. Each country is given a score from 0 to 100 in the press freedom index, with a lower score implying a freer press. The 2011 press freedom index for a country is determined on the basis of its performance in three broad categories: the legal, political and economic environment. The legal environment takes into account the extent to which freedom of expression of individuals including journalists and bloggers are protected by the law, and the extent of freedom granted by law to media regulatory bodies. The political environment category ranks a country on the basis of the following criteria – editorial independence, official and self-control of state-owned and private media, public access to media coverage, and the ability of local and foreign journalists to publish news freely and without harassment from agents of the state or others. Finally, the economic environment consists of the cost associated with establishing media agencies and government's control over media, transparency and concentration of media ownership, and the extent to which journalists and bloggers are influenced by economic incentives from private or public sources.

Population ($log\,(Population)$) data comes from the World Bank. The data for the proportion of population belonging to Christian ($Christian$) and Muslim ($Muslim$) faiths in the total population is obtained from the Association of Religion Data Archive.[13] The data on urban population ($Urban$) comes from the World Bank and refers to the percentage of population living in the areas which have been defined as 'urban' by the country's national statistical office. The World Bank also provides data for the number of cellphone subscribers

[13] http://thearda.com. The principal investigators for this data set are the following: Jaime Harris, Robert R. Martin, Sarah Montminy, and Roger Finke of The Association of Religion Data Archive.

Table 3.1: Summary statistics

Variable	Mean	Std. Dev.	Obs.
Control of Corruption Index	0.009	0.991	164
Corruption Perception Index	4.088	2.117	154
Facebook penetration (2012)	20.469	18.5	164
Internet penetration	37.675	28.373	164
Per Capita Gross Domestic Product	15194.849	16631.693	164
Political Rights	3.299	2.082	164
Press Freedom	46.791	22.843	163
log(Population)	15.76	1.994	164
Christian Proportion (2005)	57.952	37.613	164
Muslim Proportion (2005)	22.676	33.915	164
Cellphone penetration	97.751	40.389	163
Urbanization	55.416	23.325	164
Average Years of Tertiary Schooling Attained (2010)	8.207	2.651	128
Openness to trade	50.824	24.34	150
1500 Communication Technology Adoption Index	0.443	0.401	106

All the variables belong to year 2011, unless otherwise indicated in brackets next to them. Whenever possible we use the control variable for the same year as the internet penetration. The data for Facebook penetration for year 2011 was available for a limited number of countries, hence, we use Facebook penetration data for year 2012.

per capita. Average years of tertiary schooling attained has been used a measure of educational attainment for which the data source is Barro and Lee (2013) . The share of imports in GDP is used as a measure of openness using data from the World Bank. Summary statistics are presented in Table 3.1.

Figure 3.1 presents the scatter plot of internet penetration and corruption, and Figure 3.2 presents the scatter plot of Facebook penetration and corruption. These figures indicate a negative association between internet penetration and corruption, and Facebook penetration and corruption.

3.2.2 Empirical strategy

In order to assess the impact of Facebook penetration on corruption, we estimate the following equation:

$$\begin{aligned} Corruption_i = \alpha + \beta\, Facebook_i + \delta\, Internet_i + \gamma_1 \log(GDPPC_i) + \gamma_2\, Political\, Rights_i \\ + \gamma_3 \log(Population_i) + \gamma_4\, Christian_i + \gamma_5\, Muslim_i + \gamma_6\, Urban_i + \varepsilon_i \quad (3.1) \end{aligned}$$

where subscript i denotes the country. Since we use the negative of the corruption index implying a higher value means higher corruption, β and δ are expected to be negative.

We control for (log of) GDPPC since rich countries can afford to have better institutions and therefore may be able to control corruption more effectively (Treisman, 2000). As a result, the coefficient of $\log(GDPPC)$ is expected to be negative. Corruption is lower in countries with long democratic history, parliamentary system, and politically stability (Treisman, 2000; Lederman et al., 2005; Campante et al., 2009).[14] In countries where people enjoy higher political rights, the press is free and the judiciary is independent, corruption is

[14] Campante et al. (2009) find a U-shaped relationship between the corruption perception and several measures of incumbent stability (such as average tenures of chief executives and governing parties): corruption is greater under very stable and unstable regimes compared to regimes with intermediate stability.

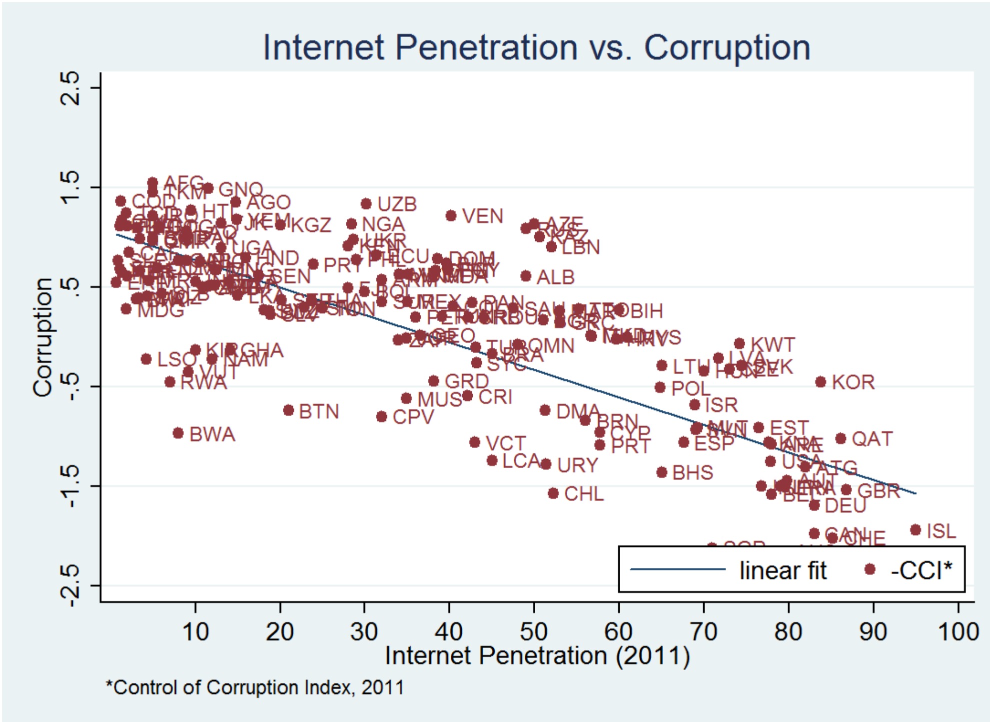


Figure 3.1: Internet penetration and corruption

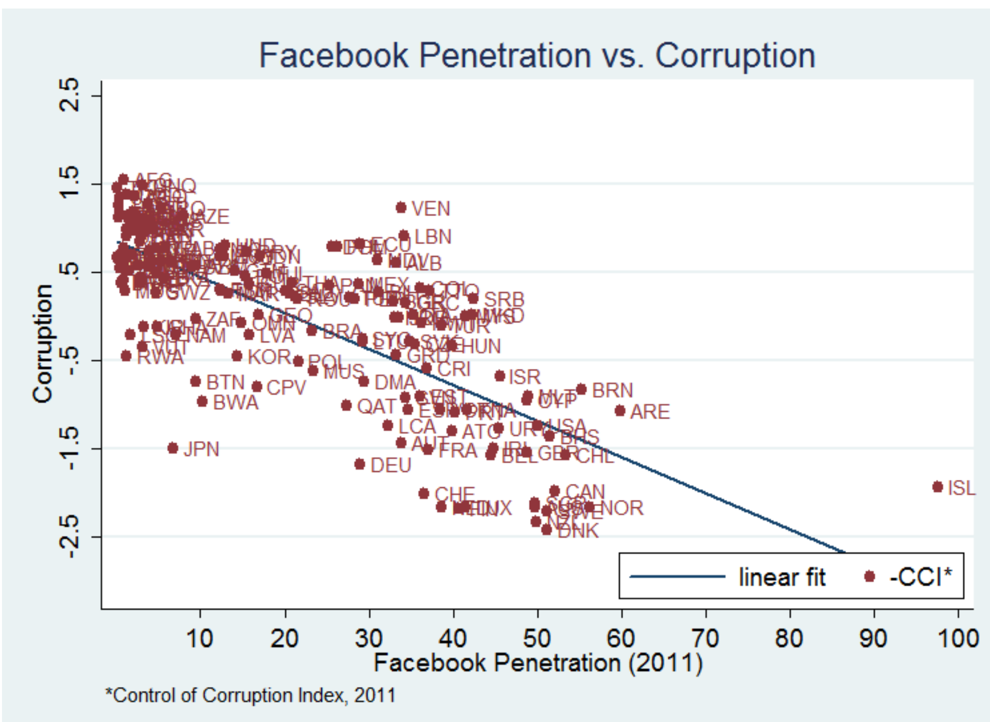


Figure 3.2: Facebook penetration and corruption

likely to be lower (Brunetti and Weder, 2003; Lederman et al., 2005). Therefore, we control for political rights as a measure of democratic and political institutions. We use the negative of political rights in all our specifications so that a higher number indicates higher political rights. Thus, expected sign of the coefficient of the *Political Rights* is negative. In countries with very large population the cost of controlling corruption may be high. Consequently, we also control for the (log of) population. Cultural factors have important bearings on corruption (Alatas et al., 2009) and hence following the previous literature (Swamy et al., 2001), we control for the proportion of population belonging to Christian and Muslim faiths in order to capture cultural aspects of corruption. It is often argued that internet penetration would be higher in urban areas or places with high population density. Also, urbanization in an area may potentially be correlated with corruption and/or Facebook penetration and internet diffusion. Hence, we control for the proportion of population living in urban areas.

3.2.3 Potential Endogeneity and IV Analysis

Different countries exert control on the internet in different ways. While some may curb internet usage, others may restrict content, and yet others may allow internet usage only to monitor the activities of its citizens on the internet. A number of countries have begun regulating and/or censoring the content that can be published and shared on the internet using different mechanisms. For example, countries like China and Iran use a very sophisticated and multi-layered censoring system in order to restrict the content that can be accessed by citizens (Freedom House, 2009). Another example is the Tunisian government creating focal points of control in order to censure the internet prior to 2011 (Wagner, 2012). In less oppressive regimes such as Egypt, Russia, and Malaysia where the internet was of paramount importance in creating a free speech environment, vague and flexible security laws are used in order to intimidate bloggers and thereby suppress anti-government ideas from spreading over the internet (Freedom House, 2009).

As mentioned earlier, once internet penetration is instrumented for, the coefficients of both Facebook penetration and internet penetration will be unbiased since countries restrict freedom on the net discouraging the use of internet causing the Facebook penetration to be lower. In general, countries do not curb the social media usage while allowing freedom on internet elsewhere. Hence, once people decide to take an internet connection under restricted freedom, for the typical individual whether or not to be a member of the Facebook is hardly a decision that is contingent upon how much freedom they enjoy regarding what (anti-government stories) they can share on their Facebook wall.

We find that there is a high correlation between technology adoption in communication in 1500 AD and internet penetration today. At the same time, there is little reason to expect that the 1500 communication technology will have a direct impact on modern corruption making it a strong and valid instrument for internet penetration today. We, therefore, use the measure of technology adoption in communication in 1500 AD created by Comin et al. (2010) as an instrument for internet penetration today. Murray (2006a) cautions that in an IV estimation, one needs to be extra careful about the omitted variables since the IV estimates are biased not only when an incorrectly omitted variable is correlated with other explanatory variables but also when it is correlated with the instruments. Hence, we control for historical as well as contemporary variables that could be potentially correlated with our instrument and/or other explanatory variables.

3.3 Results

3.3.1 OLS estimates

Table 3.2 presents the OLS estimates of the specification given in equation 3.1. Consistent with the hypothesis, the coefficient of Facebook penetration is negative and highly significant in the baseline specification reported in column 1.

Table 3.2: Facebook and Corruption: OLS estimates. Dependent Variable: Control of Corruption Index.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Facebook penetration	-0.0121***	-0.0114***	-0.0111**	-0.0129***	-0.0102**	-0.0162***	-0.0144***
	(0.00453)	(0.00435)	(0.00449)	(0.00489)	(0.00483)	(0.00427)	(0.00500)
Internet penetration	-0.0173***	-0.0151***	-0.0178***	-0.0165***	-0.0201***	-0.0185***	-0.0179***
	(0.00392)	(0.00371)	(0.00413)	(0.00418)	(0.00474)	(0.00369)	(0.00518)
log(GDP per capita)	0.0288	0.0124	-0.0547	-0.00241	0.00746	-0.0486	-0.246**
	(0.0808)	(0.0782)	(0.0875)	(0.0804)	(0.107)	(0.0878)	(0.106)
Political Rights	-0.114***		-0.113***	-0.132***	-0.0986***	-0.121***	-0.106***
	(0.0260)		(0.0260)	(0.0279)	(0.0302)	(0.0240)	(0.0291)
Press Freedom		-0.0143***					
		(0.00271)					
Christian Proportion	0.00426**	0.00442**	0.00479**	0.00495**	0.00343*	0.00586***	0.00460*
	(0.00195)	(0.00199)	(0.00188)	(0.00193)	(0.00189)	(0.00223)	(0.00234)
Muslim Proportion	0.00532***	0.00465**	0.00536***	0.00679***	0.00410**	0.00678***	0.00582***
	(0.00186)	(0.00187)	(0.00178)	(0.00193)	(0.00177)	(0.00185)	(0.00186)
log(Population)	0.0611***	0.0455**	0.0673***	0.0626***	0.0454*	0.0345*	0.00341
	(0.0187)	(0.0187)	(0.0179)	(0.0232)	(0.0250)	(0.0186)	(0.0287)
Urbanization	-0.000117	-0.000907	-0.00122	0.00221	-0.00255	-0.000164	-0.000522
	(0.00309)	(0.00316)	(0.00312)	(0.00285)	(0.00387)	(0.00319)	(0.00358)
Cellphone penetration			0.00396***				0.00355*
			(0.00143)				(0.00207)
Average years of tertiary schooling attained					0.203		0.146
					(0.216)		(0.169)
Openness to trade				0.000540			-0.00253
				(0.00310)			(0.00243)
Continent Dummies						Yes	Yes
Observations	164	163	163	150	128	164	119
Adjusted R^2	0.715	0.739	0.726	0.726	0.726	0.764	0.789

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. A higher value of corruption index implies higher corruption. Constant not reported.

Next, we control for a number of variables in order to minimize the omitted variable bias. First, we replace the political rights index with the press freedom index in the baseline specification and present the results in column 2. The reason for doing so is that the coefficient of Facebook penetration may be capturing a part of the effect of press freedom on corruption when press freedom is omitted from the model. We use negative of the press freedom index and therefore expect the coefficient of this variable to be negative. The coefficient of Facebook penetration remains highly significant with the expected negative sign. In column 3, we control for cellphone penetration as they are also used as means of communication. This does not seem to have much of an impact on the coefficient of internet penetration. It has been shown that countries with higher human capital are less corrupt (Glaeser and Saks, 2006). Corruption is lower in more open countries (Ades and Di Tella, 1999) and greater in countries with protectionist trade policies (Dutt, 2009). We find that our results are robust to the inclusion of the average years of tertiary schooling attained (column 4) and openness to trade (column 5). In column 6 we include continent dummies to rule out the possibility that these results are driven by the omission of continent-fixed factors. Finally, column 7 controls for all the variables in the same specification along with continent dummies. The coefficient of Facebook penetration is highly significant in each column with the expected sign. Moreover, in all the specifications, the coefficient of internet penetration is highly significant with the expected negative sign.

As argued earlier, many countries restrict freedom on the net making internet penetration endogenous to the model and, therefore, the OLS estimates are likely to be biased. Hence, in the next section, we present the two stage least squares (2SLS) estimates.

3.3.2 IV Results

Table 3.3 reports the results of the IV analysis using the 1500 communication technology as an instrument for the internet penetration today. Column 1 in panel 1 shows that commu-

nication technology in 1500 AD is a significant predictor of internet penetration today. In panel 2, we present the IV estimates. The coefficient of Facebook penetration appears with the expected sign and is statistically significant at conventional levels. Next, we address potential concerns regarding the validity of our instrument by controlling for a number of historical as well as contemporary variables whose omission may lead to the violation of the exclusion restriction.

First, there may be concerns that technology in 1500 AD might be correlated with institutions in 1500 AD, which might be correlated with institutions today. Since controlling for modern institutions might lead to biased estimates, we control for the colonial status of a country, which is exogenous, as a proxy for institutional quality. Acemoglu and Robinson (2001) argue that colonial status is a good proxy for institutions. Following previous literature (Treisman, 2000 and Swamy et al., 2001), we include dummies for former British colonies and countries that were never colonized (column 2).[15] Column 3 controls for cultural variables which are arguably exogenous to corruption (Treisman, 2000). In both the columns, 1500 communication technology remains a significant predictor of internet penetration today and the coefficient of Facebook penetration is statistically significant.

There may still be a concern, however, that the countries that had better technology in 1500 AD might have also had higher incomes. Those countries may have been able to constrain corruption more effectively in the beginning which may persist over time. If this is true, then we need to control for the income levels in 1500 AD. Though there are no data available for income levels of countries in 1500 AD, following Acemoglu et al. (2002), we control for the urbanization in 1500 AD as a proxy for economic prosperity of that period.[16] There is another advantage of controlling for the urbanization rate in 1500 AD. It is possible

[15] Our results are, however, robust to the inclusion of dummies for French colonies, Spanish and Portuguese colonies, and colonies of countries other than Britain, France, Spain, and Portugal. We take the colonial status data from Treisman (2007).

[16] Acemoglu et al. (2002) argue that urbanization and population density are good proxies for economic prosperity. However, they note that the association between population density and economic prosperity is theoretically weaker than that between urbanization and economic prosperity making the latter our preferred measure of economic prosperity in 1500 AD. We borrow this data from Acemoglu et al. (2002).

that there are some fixed factors which have an impact on technology adoption as well as corruption. If these fixed factors are also correlated with income levels or urbanization, then controlling for 1500 AD urbanization will partially address this issue as well. In addition, we control for cultural factors by including the proportion of Christians and Muslims in the total population as additional regressors. The estimates are then no longer biased by the omission of the cultural factors that persist for centuries and have an impact on corruption as well as technology adoption. Technology adoption in 1500 AD remains a significant predictor of internet penetration today even after controlling for urbanization in 1500 AD (panel 1 column 4). In panel 2 (column 4), the coefficient of Facebook penetration is highly significant with negative sign suggesting that Facebook penetration impacts corruption negatively.

Although these results are very convincing that Facebook penetration has a causal and negative impact on corruption, owing to the cross-sectional nature of our analysis, in the next three columns we control for a number of historical as well as contemporary variables to check the robustness of our estimates.

First, we control for the years since neolithic revolution – years since humans moved from a hunter-gatherer society to the agrarian society and began cultivating crops and domesticating animals. Years since neolithic revolution has been recognized as an important factor in determining the historical development (Olsson and Hibbs, 2005.) Hence, in column 5, we control for the years since neolithic revolution along with urbanization and cultural controls. One final concern could be that the general level of technology in 1500, which is likely to be correlated with the technology adoption in communication in year 1500, may have an effect on corruption via the use of technologies other than internet penetration. If this is true, then our estimates may be biased upwards if the general level of technology adoption is omitted from the model. In order to address this concern, we control for the general level of technological adoption in 1500 (excluding communication technology) in column 6. Finally, in column 7, we control for a number of contemporaneous variables – GDP per capita,

population, urbanization, cellphone penetration, and openness to trade.[17] The coefficient of Facebook penetration appears with the expected sign across different specifications and is statistically significant at conventional levels. Moreover, in all these specifications, the coefficient of internet penetration is statistically significant and negative indicating that internet penetration has negative impact on corruption. These IV coefficients are somewhat larger than the OLS estimates suggesting that OLS estimates are biased downwards because of endogeneity. Furthermore, the $F-$statistic at the bottom of the table indicates that the instrument is strong in each column.

The results presented in this section are robust and show that Facebook penetration has a negative impact on corruption. Moreover, these effects are sizable – even with our most conservative OLS (IV) estimates, a one-standard deviation increase in the Facebook penetration leads to more than a one-fifth (one-fourth) of a standard deviation improvement in the corruption index. Similarly, even with our most conservative estimate, in addition to its impact on corruption through Facebook, a one-standard deviation increase in internet penetration reduces corruption by about two-fifth of a standard deviation.

3.3.3 Robustness Checks

Sensitivity to the use of an alternative corruption index

Table 3.4 reports the results using the 2011 Corruption Perception Index published by Transparency International.CPI takes values in the range of 1 to 10 where a higher number represents lower corruption. We use the negative of this index in all our regressions and therefore expect the coefficient Facebook penetration to be negative. We present results for OLS, median, and robust regressions. In all the columns, the coefficient of Facebook penetration is significant at conventional levels with expected sign.

[17] Note that inclusion of contemporaneous variables is likely to induce bias in the estimated coefficients, however, the fact that the coefficients of both Facebook penetration and internet penetration are still highly significant and comparable to the coefficients reported in previous columns strengthens the confidence in the estimated coefficients.

Table 3.3: Facebook, Internet and Corruption: IV estimates. Instrument: Technology adoption in communication in 1500 AD. Instrumented: Internet Penetration.

	First-stage Regression. Dependent variable: Internet Penetration.						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Technology adoption in communication in 1500	20.05***	17.41***	19.47***	26.36***	33.44***	33.34***	16.54***
	(3.780)	(3.554)	(3.703)	(4.023)	(5.117)	(8.518)	(3.805)
$F-$statistic (excluded instrument)[#]	28.131	24.006	27.639	42.913	42.715	15.321	18.907
	Second-stage Regression. Dependent variable: Control of Corruption Index.						
Facebook penetration	-0.0240**	-0.0247**	-0.0235**	-0.0271***	-0.0177*	-0.0182*	-0.0192**
	(0.0119)	(0.0125)	(0.0115)	(0.00913)	(0.00951)	(0.0105)	(0.00913)
Internet penetration	-0.0175**	-0.0156*	-0.0161**	-0.0238***	-0.0304***	-0.0279***	-0.0193*
	(0.00799)	(0.00899)	(0.00809)	(0.00592)	(0.00603)	(0.00774)	(0.0114)
Urbanization in 1500				Yes	Yes	Yes	
Years since transition to agriculture					Yes	Yes	
Technology in 1500 (excluding communication sector)						Yes	
Colonial Dummies		Yes	Yes				Yes
Cultural Controls			Yes	Yes	Yes		Yes
Contemporaneous Controls							Yes
Observations	106	104	103	67	66	66	95

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. A higher value of corruption index implies higher corruption. Colonial dummies: dummies for former British colonies, and never colonized. Cultural controls: the proportion of Christians and proportion of Muslims in the total population. Other contemporaneous controls: log*(GDPPC),* log*(population), urbanization, cellphone penetration, and openness to trade.* Technology adoption in 1500 is an average of technology adoption in the following sectors: agriculture, transportation, military, and industry. [#]The reported F-statistics are Kleibergen-Paap rk Wald F-statistic (as reported by STATA 13) which are valid when i.i.d. assumption is dropped and “robust” option is invoked.

Table 3.4: Facebook and Corruption. Dependent Variable: Corruption Perception Index.

	OLS (1)	Median (2)	Robust (3)
Facebook penetration	-0.0212**	-0.0262*	-0.0221**
	(0.0101)	(0.0145)	(0.0107)
Internet penetration	-0.0426***	-0.0393***	-0.0436***
	(0.00950)	(0.0120)	(0.00883)
log(Per Capita GDP)	0.0680	0.0263	0.0702
	(0.168)	(0.256)	(0.188)
Political Rights	-0.160***	-0.200**	-0.174**
	(0.0570)	(0.0908)	(0.0669)
Christian Proportion	0.0102**	0.00431	0.00873*
	(0.00425)	(0.00610)	(0.00449)
Muslim Proportion	0.0112***	0.00345	0.00864*
	(0.00412)	(0.00659)	(0.00485)
log(Population)	0.0898**	0.0269	0.0838
	(0.0444)	(0.0807)	(0.0594)
Urbanization	-0.00415	0.00475	-0.00135
	(0.00781)	(0.00991)	(0.00729)
Observations	154	154	154
Adjusted R^2	0.697		0.669

In column 1, robust standard errors in parentheses. In columns 2 and 3, standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. A higher value of corruption index implies higher corruption. Constant not reported.

Median and Robust Regressions

In order to ascertain that our estimates are not driven by outlying observations, we perform median and robust regressions for the baseline specification used in the main text (column 1 of Tables 2 and 3). The advantage of median and robust regressions are that outlying observations do not affect the estimated coefficients disproportionately. These results are reported in Table 3.5.

Table 3.5: Facebook and Corruption: Median & Robust Regressions. Dependent Variable: Control of Corruption Index.

	Median Regression		Robust Regression	
	(1)	(2)	(3)	(4)
Facebook penetration	-0.0146**	-0.0110*	-0.0123**	-0.0158***
	(0.00623)	(0.00594)	(0.00474)	(0.00449)
Internet penetration	-0.0177***	-0.0202***	-0.0177***	-0.0185***
	(0.00500)	(0.00502)	(0.00380)	(0.00379)
Baseline Controls #	Yes	Yes	Yes	Yes
Continent Dummies #		Yes		Yes
Observations	164	164	164	164
Adjusted R^2			0.696	0.743

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. A higher value of corruption index implies higher corruption. #Baseline Controls: log(*Per Capita GDP*), *Political Rights*, *Christian Proportion*, *Muslim Proportion*, log(*Population*), and *Urbanization*. Constant not reported.

In columns 1 and 3, the coefficient of internet penetration is highly significant and has expected negative sign. Further, the coefficients are comparable to the OLS coefficients reported in the main text (see Table 2). Columns 2 and 4 present the results of the baseline specification with Facebook penetration included in the model. Coefficients of both, Facebook penetration and internet penetration, have expected signs and are comparable to those reported in Table 3. These suggest that our results are not driven by outliers.

Excluding Countries with Highest and Lowest Facebook Penetration

We check the robustness of our estimates by dropping countries where the Facebook penetration is the highest and the lowest. The first two columns of Table 3.6 presents the results of the regressions that exclude the countries which are in the bottom and top 10% percent in Facebook penetration respectively. The third column presents the results dropping countries in the bottom and top 5% in terms of Facebook penetration. Although the coefficient of the Facebook penetration is smaller in when countries with highest Facebook penetration is dropped, it remains statistically significant at conventional levels. Moreover, Facebook penetration and internet penetration are jointly highly significant.

Table 3.6: Facebook and Corruption: Excluding Countries with Highest and Lowest Facebook Penetration

	Excluding Bottom 10%	Excluding Top 10%	Excluding Top and Bottom 5%
	(1)	(2)	(3)
Facebook penetration	-0.0153***	-0.00955*	-0.0143**
	(0.00436)	(0.00543)	(0.00555)
Internet penetration	-0.0179***	-0.0173***	-0.0179***
	(0.00387)	(0.00399)	(0.00401)
Baseline Controls #	Yes	Yes	Yes
Observations	147	147	147
Adjusted R^2	0.748	0.691	0.722

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The dependent variable is the negative of the control of corruption index such that a higher value implies higher corruption. #Baseline Controls: log(*Per Capita GDP*), *Political Rights*, *Christian Proportion*, *Muslim Proportion*, log(*Population*), and *Urbanization*. Constant not reported.

Dropping Countries Where Facebook is Severely Restricted

As argued in the main text, although our assumption that the Facebook penetration is exogenous conditional on the internet penetration being instrumented, is a reasonable one; we check if our results are sensitive to the exclusion of those countries where Facebook usage is restricted. Some of these countries are not in our sample to begin with as there is no data for these countries, possibly because the number of Facebook users is extremely small. There are some countries, however, where Facebook is partially banned or where people use Facebook stealthily such as by using a proxy or a virtual private network (VPN). Hence, we exclude the following major countries where Facebook is either banned or severely restricted. These countries are Bangladesh, China, Cuba, Egypt, Iran, Mauritius, North Korea, Pakistan, Syria, Tunisia, and Vietnam. Results of the OLS and IV regressions with the restricted sample are presented in Table 3.7.

Table 3.7: Facebook, Internet and Corruption: IV estimates for Restricted Sample. Instrument: Technology adoption in communication in 1500 AD. Instrumented: Internet Penetration.

	OLS		IV First-stage Regression. Dependent variable: Internet Penetration.			
	(1)	(2)	(3)	(4)	(5)	(6)
Technology adoption in communication in 1500			18.98***	33.74***	32.72***	17.21***
			(4.011)	(5.234)	(8.870)	(3.875)
$F-$statistic (excluded instrument)#			22.399	44.039	13.605	19.740
	OLS		**Second-stage Regression.**			
	Dependent variable: Control of Corruption Index.					
Facebook penetration	-0.0118**	-0.011**	-0.0221*	-0.0175*	-0.0208*	-0.0180**
	(0.00465)	(0.00448)	(0.0134)	(0.00943)	(0.0114)	(0.00907)
Internet penetration	-0.0178***	-0.0155***	-0.0186**	-0.0308***	-0.0264***	-0.0198*
	(0.00417)	(0.00394)	(0.00882)	(0.00582)	(0.00845)	(0.0110)
Colonial Dummies	Yes	Yes	No	No	No	Yes
Cultural Controls	Yes	Yes	No	Yes	No	Yes
Historical Controls	No	No	No	Yes	Yes	No
Additional Controls	Yes	Yes	No	No	No	Yes
Observations	158	157	100	60	60	89
Adjusted R^2	0.762	0.773	0.726	0.821	0.806	0.754

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. A higher value of corruption index implies higher corruption. Colonial dummies: dummies for former British colonies, and never colonized. Cultural controls: the proportion of Christians and proportion of Muslims in the total population. Historical controls: urbanization in 1500, years since transition to agriculture, general technology except communication (only column 3). Additional controls: *log(GDPPC), log(population), urbanization, cellphone penetration, openness to trade, political rights (only column 1), press freedom (only column 2).* # The reported F-statistic are Kleibergen-Paap rk Wald F statistic (as reported by STATA 13) which are valid when i.i.d. assumption is dropped and "robust" option is invoked.

In Table 3.7, the first two columns present the OLS estimates, and the last four columns present IV estimates where internet penetration is instrumented with the technological adoption in communication in 1500. As we can see, the relationship between the Facebook penetration and corruption is highly statistically significant in each column. Moreover, these coefficients are very stable across specifications and are comparable to those reported in the main text in the analysis of the entire sample. These results provide an assurance that the relationship between the Facebook penetration and corruption is not driven by the countries that ban the use of Facebook.

3.4 Falsification test for the Facebook-corruption relationship

In order to further establish that the relationship between Facebook penetration and corruption is causal, we present a falsification test for the Facebook-corruption relationship in this section. If our results are driven by omitted variables, then we should observe a significant relationship between Facebook penetration and corruption even before Facebook came into existence in 2003. In column 1 of Table 3.8, our dependent variable is the 1996 CCI. As we can see, the coefficient of Facebook penetration is not significant conditional on internet penetration and other control variables for the same year (see notes below the table). The coefficient of Facebook penetration is small, has the expected sign and significant at the 10% level when the dependent variable is the 2005 CCI in column 2. We believe that since Facebook had only been launched in 2003, it was not yet popular enough to have a larger effect by 2005. However, when the dependent variable is the 2011 CCI, the coefficient of Facebook penetration is not only significant but also about 50 percent larger than the coefficient in column 2. These estimates indicate that the results are not driven by some omitted variables and Facebook penetration has a causal impact on corruption.

Table 3.8: Facebook and Corruption: Falsification Test.

	Dependent Variable: Control of Corruption Index for		
	year → 1996	2005	2011
Facebook penetration	-0.00741	-0.00801*	-0.0121***
	(0.00580)	(0.00429)	(0.00453)
Internet penetration	-0.110***	-0.0220***	-0.0173***
	(0.0220)	(0.00307)	(0.00392)
Baseline Controls#	Yes	Yes	Yes
Observations	141	167	164
Adjusted R^2	0.735	0.801	0.715

Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. A higher value of corruption index implies higher corruption. Control variables are taken from the same year as the corruption index except proportions of Christians and Muslims in the total population which are taken from year 2005. Facebook penetration in each column is from year 2012. #Baseline Controls: log(*Per Capita GDP*), *Political Rights*, *Christian Proportion*, *Muslim Proportion*, log(*Population*), and *Urbanization*. Constant not reported.

3.5 Conclusion

We investigate how digital media that provides for the possibility of two-way communication impacts corruption using data for over 150 countries. At a time when freedom on the net is under threat in several parts of the world and is major concern around the world, this study is a first and timely one to underscore the importance of social media for corruption. We find a sizable and statistically significant impact of Facebook penetration on corruption. We also find that internet penetration has a significant and negative impact on corruption which is consistent with the findings of previous studies.

Our analysis, however, uses unofficial Facebook data and we only have data on Facebook penetration. Ideally, it would be better to have data on the total number of social media users in every country. Future research should be targeted at assessing the impact of social media on corruption more broadly. We believe that as social media use continues to expand rapidly, more research on this topic, especially incorporating other social media platforms is necessary. In addition, the privacy settings of Facebook may also undermine the impact of social media

on corruption. Clearly, the degree of anonymity of users sharing their bribing experiences may play a crucial role in the realization of the effect of social media on corruption. Future research should also investigate this hypothesis.

Chapter 4. Effectiveness of Asymmetric Liability Policy: A Theoretical Investigation

4.1 Introduction

The effectiveness of asymmetric liability policy on reducing bribe occurrences has recently attracted considerable attention from researchers.[1] A number of theoretical as well as experimental papers investigate if asymmetric liability policy – policy that gives legal impunity to bribe-givers, as opposed to symmetric liability policy under which the bribe-giver is also considered to be an accomplice in the crime, has the potential to reduce bribery. The intuition is simple – when the bribe-giver is considered to be an accomplice in the crime and is, therefore, subject to legal sanctions he/she has little incentive to report bribery. On the other hand, a bribe-giver is more likely to report having paid a bribe when she is awarded legal immunity. In a world where a bribery is more likely to be discovered when it is reported as opposed to when it is not reported, providing legal immunity to bribe-givers would result in reduction in bribe demand by corrupt officials.

While the implementation of asymmetric liability policy may be relevant for all kinds of bribes, its relevance for a special kind of bribes called *harassment bribes or extortionary bribes* – where the bribe-giver is forced to pay a bribe for the services he/she is entitled to – is considered to be relatively less debatable compared to *collusive bribery* – where a person pays bribes in order to obtain undue favors.[2]

[1] More recently, the asymmetric liability regime has been widely debated after Basu (2011) proposed legal immunity to the bribe givers in India arguing that this policy will reduce bribery by increasing the bribe-reporting. He also proposes that bribe be refunded to the bribe giver, once bribery is established, to further incentivise bribe reporting. However, Basu's policy has been criticized on several grounds (for example, see Drèze (2011)). Note that in several countries such as China, Japan and Russia legal punishment for bribe-giver is milder than that for bribe-taker. On the other hand, countries such as Germany, UK, and USA treat bribe-giver as well as bribe-taker equally culpable.

[2] More specifically, the moral issues involved with the implementation of the asymmetric liability policy

The present chapter contributes to the literature studying the impact of asymmetric liability policy on reducing bribery by investigating the effect of an alternative policy regime which we call *conditional legal immunity*. The conditional legal immunity is a modification of the asymmetric liability policy under which a bribe-giver is awarded legal immunity only if she reports having paid a bribe, otherwise, she is considered as an accomplice in the crime and is subject to legal consequences should the bribery be discovered just as under symmetric liability policy. We find that conditional legal immunity is more effective in reducing bribery in a theoretical setting. The paper most akin to the theoretical part of this chapter is Dufwenberg and Spagnolo (2014) who also investigate the impact of an equivalent policy on bribe occurrences and find that such a policy is more effective in reducing bribery than the asymmetric liability policy. This chapter, however, is methodologically different than theirs, and we derive conditions under which different policies will be successful.[3]

The rest of the chapter is organized as follows. The next section develops the theoretical model and makes predictions for bribery under different policy regimes. Conclusions are drawn in section 2.6.

4.2 The model set-up

The basics of the game are following. The citizen, C, is entitled to a license. The value of the license to the citizen is v. The citizen, on the other hand, if is denied (or indefinitely delayed) the license, has a payoff equal to 0. The official O can, however, indefinitely delay

has been an argument against the implementation of such policies. The critics argue that implementing asymmetric liability policy is likely to decrease the moral cost of bribery and may lead to the norm that bribe paying is morally acceptable. This may lead to further increase in bribery. Also, providing legal immunity may encourage citizens to offer bribes more often. Essentially, such policies will have more serious negative implications for collusive bribery. For instance, knowing that it would not be punished for paying a bribe should the bribery be discovered, a firm will have a larger incentive to pay bribes.

[3] More specifically, in this chapter, whether or not the act of bribery will be discovered is a probabilistic event. In contrast, in Dufwenberg and Spagnolo (2014) the official's cost of providing services implicitly includes the probability with which a bribery can be discovered. By introducing the probabilities of discovering a bribery we are not only able evaluate which policies are likely to be effective in reducing bribery but we can also derive conditions under which a policy is going to work.

issuing the license, and may exercise this power in order to extract bribes, b, from the citizen. Once a bribe is demanded by the official, the citizen may choose to pay or reject. In the event of paying the bribe, the citizen may further choose to report it or not.[4] The cost of reporting the bribe to the citizen is c.

The probability that a bribe incident will be discovered depends on whether or not it is reported. If the bribe is reported the probability of bribe discovery is p and the corresponding probability is p' in case it is not reported where $p > p' > 0$. Furthermore, also assume that cost of issuing license to the official is zero.[5]

Further restrictions:

- It is optimal for the citizen to get a license even after paying a bribe, $v - b \geq 0$
- A stronger restriction – the citizen is better off from having the license even after he has to bribe and incur the cost of bribe reporting, *i.e.,* $v - b - c > 0$. This assumption is needed to ensure that it is always optimal for the citizen to pay the bribe rather than go without the license.

4.3 The game

For simplicity, let's assume that there is only one interaction between the official and the citizen, and this is a common knowledge to both, the citizen and the official.[6] The official

[4] In order to simplify the analysis, we assume that the citizen does not report the demand of bribe if she chooses not to pay. It may be very difficult to prove that a bribe was demanded in case she does not pay the bribe.

[5] This assumption is in contrast with the Dufwenberg and Spagnolo (2014) who allow for a non-zero cost to the official of issuing the license. They assume that the cost of issuing the license is above zero if the official can spend this time in some other utility maximizing activity such as playing a computer game. On the other hand, the cost of issuing license is less than zero if the shirking is riskier and the probability of getting caught is substantial even though the bribe is not reported. We capture this possibility by adding the 'probability of getting caught' in the model. Furthermore, we assume that even though the official can shirk from issuing the license, he has to be present in the office during regular hours, so the cost of issuing license to him is close to zero.

[6] In many instances of harassment bribery, the assumption of single interaction may not be very far from the reality. For instance, a person facing the same clerk in the office of motor vehicles in countries like India is not very common as the driver's license are issued for 20 years. The same thing may be true for passport offices and other such services. Nevertheless, we relax this assumption later.

begins by either demanding a bribe (B) in the amount of b, or not demanding a bribe ($\neg B$). We assume that the official issues the license when he does not demand a bribe, and he demands a bribe and gets one.[7] Once the official demands a bribe, the citizen has three available actions – don't pay ($\neg P$), pay quietly (and not report) ($\neg R$), and pay and report (R). If the citizen refuses to pay, he is not granted the license. We further assume that paying the bribe is always optimal for the citizen rather than go without the license given the bribe has been demanded.[8] Thus, the bribe-giver, once the bribe has been demanded, chooses from two actions – to pay quietly, or to pay and report, given the values of other parameters of the model. Also, the exchange of bribe and license takes place simultaneously, and hence, there is not further action node for the official.

Under symmetric liability, as is currently the law, if a bribe is paid, both the parties are considered to be partners in the crime. And, therefore, if a bribe incident is detected, both are convicted and punished. The fine amount, however, may be different. Let the fine imposed on official be f_o, and on the citizen be f_c.[9]

Under asymmetric liability where the bribe-giver is given legal immunity, if a bribe incident is detected the official is convicted while the citizen is let go. Basu, 2011 also proposes that once the bribery is detected the bribe amount should be returned to the citizen. While this proposal has been criticized on the grounds that it may be practically infeasible to refund the bribe amount, we also consider this possibility. We, however, maintain that the cost of reporting a bribe is still borne by the citizen. This is assumed based on the fact that it may be even more difficult to determine the actual cost of reporting a bribe than the bribe amount itself.

[7] Following Dufwenberg and Spagnolo, 2014 we assume that bribe taking and license delivery takes place simultaneously in contrast to Buccirossi and Spagnolo, 2006 where the two acts do not take place simultaneously and an enforcement mechanism may be required. For most of the bribes falling under harassment category, usually the service is provided right away, and hence, the former is the obvious choice.

[8] This assumption, though, can be relaxed, we maintain this assumption because this is very close to reality. The bribe amount in harassment bribery is seldom large enough relative to the value of services such to make it worthwhile not to pay.

[9] Basu, 2011 suggest doubling the fine for the official implying that $f_o = f_c$. However, this assumption is not important for our analysis, nevertheless, while investigating the merits of Basu's policy we double the fine of the official irrespective of the possibility that f_c may or may not be same as f_o.

We consider the following two possibilities under asymmetric liability regime:

A. **Bribe not refunded (BNR):** This is the simple asymmetric liability case in which although the bribe giver is given the legal immunity, the bribe is not to be returned even though the bribery is established in the court of law and bribe amount is detected.

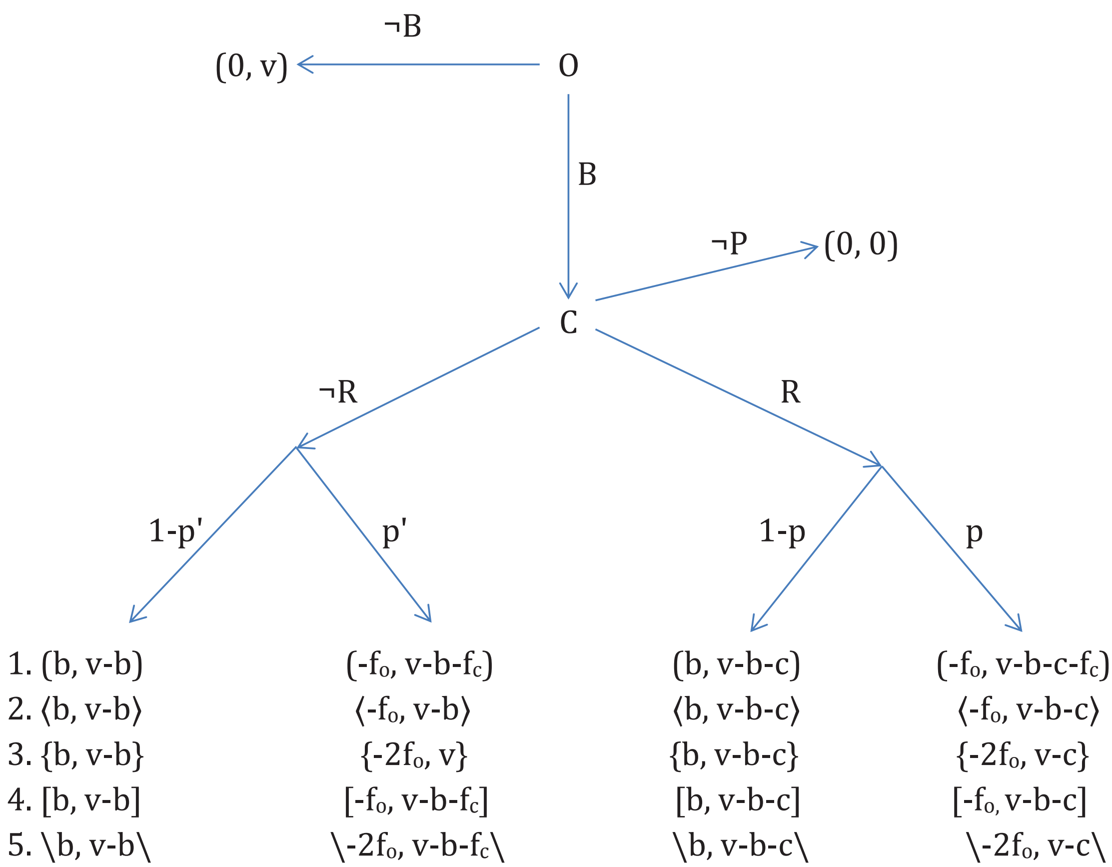
B. **Bribe Refunded (BR):** The bribe-giver is given legal immunity and the bribe is refunded, fine for the bribe taker is doubled (same as Basu's proposal).

We consider some modifications in asymmetric liability policy and Basu's policy. We call this alternative policy *conditional legal immunity*. Under conditional legal immunity, the bribe-giver is awarded legal impunity only if he/she reports having paid a bribe. If bribery is discovered by other means, then the bribe-giver shall be treated as an accomplice in the crime and symmetrical liability policy shall be applicable to her. We consider two variants of conditional legal immunity:

A. **Conditional legal immunity with no refund of bribe (CLI)**: If the bribe giver reports having paid a bribe, the asymmetric liability policy will be applicable to her, *i.e.* she will be given legal immunity. Otherwise, the bribe giver should be treated as an accomplice in the crime as it is under the current law. The bribe amount is not refunded. The bribe-taker is subject to twice the fine under symmetric liability.

B. **Conditional legal immunity with bribe returned to the citizen (CLIB)**: If the bribe-giver reports paying the bribe, not only is she given legal immunity but she is also returned the bribe amount. She shall be treated an accomplice in the crime if the bribery is discovered by other means.

Figure 4.1 represents the game. Payoffs associated with the symmetric liability is given inside the parentheses (( )), and those inside the angle brackets ($\langle\,\rangle$) and curly brackets ({ }) are associated with BNR, and BR respectively. Payoffs inside the square brackets ([ ]) and backslashes (\ \) are associated with CLI and CLIB respectively. The game can be solved by the backward induction.



Notes:

1. Symmetric liability: both the bribe-giver and the bribe-taker are culpable and subject to legal sanctions.
2. BNR (Bribe not refunded): asymmetric liability – bribe-taker punished, bribe-giver given legal impunity. Bribe not refunded.
3. BR (Bribe refunded): asymmetric liability – bribe-taker punished, bribe-giver given legal impunity. Bribe refunded to the bribe-giver. Fine of bribe-taker doubled
4. CLI (conditional legal immunity): BNR applicable only if the bribery is reported by the bribe-giver.
5. CLIB (Conditional legal immunity with bribe refunded): BR applicable only if the bribery is reported by the bribe giver.

Figure 4.1: Single-interaction game: Symmetric vs. asymmetric liability

4.3.1 Symmetric liability

The bribe-giver will report a bribery only if

$$(p' - p)(f_c) \geq c \tag{4.1}$$

Notice that the expression on the left-hand side is negative and that on the right-hand side is positive, and hence, the condition given in equation 4.1 is impossible to hold. Therefore, the citizen will always choose to pay the bribe and not to report it. The official, knowing that the citizen is never going to report, will always demand a bribe if

$$p' \leq \frac{b}{f_o + b} \tag{4.2}$$

The sub-game perfect equilibria of the game are, therefore,

$$(B, \neg R) \text{ if } p' \leq \tfrac{b}{f_o+b}, \text{ and } (\neg B, \neg R) \text{ if } p' > \tfrac{b}{f_o+b}.$$

Thus, an increase in the fine amount imposed on the official may lead to a transition from the bad equilibrium ($(B, \neg R)$) to good equilibrium ($(\neg B, \neg R)$). However, p' may be extremely small, and in such cases a very large increase in the fine may be required to reduce bribery since the bribe amount is usually very small in case of harassment bribes.

4.3.2 Asymmetric Liability

A. Bribe not refunded (BNR): The bribe-giver chooses to report a bribery incident only if

$$c \leq 0 \tag{4.3}$$

Since $c > 0$ by assumption, under asymmetric liability case the result is same as in the previous game with symmetric liability – the best action for the citizen is to pay quietly ($\neg R$). The bribe demand condition is the same as under symmetric liability (given by equation 4.2). Knowing that the bribe giver is never going to report, the official demands a bribe as long as the probability of being caught when bribe is not reported is less than or equal to the ratio of the bribe amount to the sum of the bribe amount and the fine amount imposed on official (*i.e.*, $p' \leq \frac{b}{(f_o+b)}$). Again, we have two SPEs which are same as under symmetric liability. Thus, we see that asymmetric liability is ineffective in encouraging bribe reporting as well discouraging bribe demand if the cost of reporting is borne by the bribe-giver. Hence, some incentive might be required in order to encourage the bribe-giver to report bribery.[10]

With the costless reporting, however, the citizen's optimal action in response to a bribe demand is to 'pay and report' (R). As a result, the official will demand a bribe only if

$$p \leq \frac{b}{(f_o + b)} \tag{4.4}$$

Notice that this is a stronger condition than the one reported in equation 4.3, and hence, less likely to be satisfied. Once again, we have two SPEs –

$$(B,\, R) \text{ if } p \leq \tfrac{b}{f_o+b}, \text{ and } (\neg B,\, R) \text{ if } p > \tfrac{b}{f_o+b}.$$

Thus, we see that asymmetric liability may be effective in moving the country from a bad equilibrium to a good equilibrium only if reporting is costless.

B. Bribe refunded (BR): This scenario is identical to Basu's policy – fine for bribe-taker is doubled and bribe amount is returned to the bribe-giver. Citizen's optimal action is R only if

$$(p - p') \geq \frac{c}{b} \tag{4.5}$$

[10] This is probably what Basu had in mind when he suggested a refund of the bribe amount. We discuss this issue later.

The above condition implies that the citizen is more likely to report the bribe if

1. the bribe amount, b, is very high.

2. the difference between the probability of conviction under reporting and that under not reporting $(p - p')$, is high implying that the probability of detection is significantly higher when bribery is reported.

3. cost of reporting, c, is low.

The citizen now chooses to 'pay and report' as long as the difference between p and p' is greater than the ratio of cost of reporting and bribe amount. This condition implies that BR (or Basu's policy) would be effective in encouraging bribe reporting only if the cost of reporting a bribe is less than the bribe amount itself. This is a less stringent requirement than the cost of reporting being zero as in asymmetric liability case where the bribe is not refunded. Clearly, under BR, the likelihood of bribe reporting is higher than it is under the asymmetric liability regime. However, BR does not necessarily guarantee a higher rate of reporting and will be ineffective if corruption is so rampant in a country that reporting increases the likelihood of a bribe detection only marginally, and the cost of reporting is high relative to bribe amount.[11]

BR is also more likely to reduce bribe demand even if it is not successful in inducing bribe reporting. There are two possible scenarios:

i. $(p - p') < \frac{c}{b}$: the bribe-giver does not report having paid a bribe. Therefore, the official is likely to demand a bribe only if

$$p' \leq \frac{b}{2f_o + b} \tag{4.6}$$

[11] This concern is of particular importance for countries like India where the judicial process is highly inefficient and very lengthy, often taking years. Thus, it is quite possible that despite its obvious merits, BP might be ineffective in inducing bribe reporting in countries like India. BP may, therefore, be more effective in deterring bribery in countries where the cost of reporting is not exorbitantly high.

ii. $(p - p') \geq \frac{c}{b}$: in this case the bribe-giver reports having paid a bribe. As a result, the official will demand a bribe only if

$$p \leq \frac{b}{2f_o + b} \tag{4.7}$$

Thus, we see that BP is likely to reduce bribery even if it is unable to induce bribe reporting. This is because BP advocates doubling the fine for the bribe-taker which makes it costlier for the official to demand a bribe. There are multiple SPEs depending upon the parameter values of the model.

a. $(p - p') < \frac{c}{b}$

- $p' \leq \frac{b}{2f_o+b}$ – the associated SPE is $(B, \neg R)$.
- $p' > \frac{b}{2f_o+b}$ – the associated SPE is $(\neg B, \neg R)$.

b. $(p - p') \geq \frac{c}{b}$

- $p \leq \frac{b}{2f_o+b}$ – the associated SPE is (B, R).
- $p > \frac{b}{2f_o+b}$ – the associated SPE is $(\neg B, R)$.

Proposition 1. *BP will be effective in increasing bribe reporting only if the cost of bribe reporting is very small relative to the bribe amount. BP with bribe not refunded is no better than BNR in encouraging bribe reporting.*

Proof. When bribe is not refunded, the game tree is modified as follows – if bribe is detected, the payoff of the citizen is now lower by the amount of bribe (b) under both the cases reporting and non-reporting. Hence, modified payoffs for the citizen under BP is the same as the asymmetric liability. Then from equation 4.3.

4.3.3 Conditional Legal Immunity

A. Conditional legal immunity with no refund of bribe (CLI): Following the criticisms that it might be difficult to determine the actual bribe amount, we begin with the case in which the bribe amount is not refunded. In this case, the bribe-giver chooses to 'pay and report' if

$$p' \geq \frac{c}{f_c} \tag{4.8}$$

The above condition implies that the citizen is more likely to report the bribery if

1. the fine imposed on the bribe-giver, if she does not report and bribery is detected, is very high,
2. the probability of conviction when bribery is not reported, p', is high, and
3. cost of reporting, c, is low.

The bribe demand condition for the official is same as it is in symmetric liability case and is given by equation 4.2. The SPEs associated with the CLI are given below:

a. $p' \geq \frac{c}{f_c}$
   - $p \leq \frac{b}{f_o+b}$ – the associated SPE is $(B,\ R)$.
   - $p > \frac{b}{f_o+b}$ – the associated SPE is $(\neg B,\ R)$.

b. $p' < \frac{c}{f_c}$
   - $p' \leq \frac{b}{f_o+b}$ – the associated SPE is $(B,\ \neg R)$.
   - $p' > \frac{b}{f_o+b}$ – the associated SPE is $(\neg B,\ \neg R)$.

The above condition implies that a bribe-giver is more likely to report the bribery under conditional legal immunity than under NBR.

B. Conditional legal immunity with bribe refunded (CLIB): What happens if the bribe is refunded to the citizen and the official is fined twice the amount that is to be paid under symmetric liability as suggested by Basu (2011)? The bribe-giver will report having paid a bribe only if

$$bp + p'f_c \geq c \tag{4.9}$$

1. the fine imposed on the bribe-giver, if she does not report and bribery is detected, is very high
2. the probability of conviction, when the bribe-giver reports the bribery and does not report the bribery, p and p', is high, and
3. cost of reporting, c, is low.

The official's optimal action is the same as under BR depending on whether or not the bribe-giver reports the bribery. If $bp + p'f_c \geq c$, then official's optimal action is given by 4.6, and when $bp + p'f_c < c$, then official's optimal action is given by 4.7.

The SPEs associated with the CLIB are given below:

a. $bp + p'f_c \geq c$

- $p \leq \frac{b}{2f_o+b}$ – the associated SPE is $(B,\ R)$.
- $p > \frac{b}{2f_o+b}$ – the associated SPE is $(\neg B,\ R)$.

b. $bp + p'f_c < c$

- $p' \leq \frac{b}{2f_o+b}$ – the associated SPE is $(B,\ \neg R)$.
- $p' > \frac{b}{2f_o+b}$ – the associated SPE is $(\neg B,\ \neg R)$.

The citizen, therefore, chooses to report if the probability that the bribery will be detected, even when she does not report it, is greater than the ratio of the cost of reporting and the sum of payoff from having the license and the fine imposed on the bribe-giver.

The following propositions summarize the findings of this section.

Proposition 2. *Conditional legal immunity with bribe refunded (CLIB) is more likely to increase the bribe reporting than BR (or BP), and hence, more likely to deter bribes than BR (or BP).*

Proof. Comparing equations 4.5 and 4.9. CLI more effective if

$$bp + p' f_c > bp - bp'$$
$$\implies p' f_c > -bp'$$

Since LHS is positive and RHS is negative, the above condition always holds. And hence, CLI is more likely to increase the bribe reporting than BP when bribe is refunded under CLI just like in BP.

Proposition 3. *If the bribe amount is not refunded, then CLI performs better than BR (or BP) in inducing bribe reporting only if the ratio of the difference between the two probabilities of bribe detection (under reporting and non-reporting,* i.e., $p - p'$*) and the probability of bribe detection when it is not reported by the bribe-giver, is less than the ratio of fine imposed on the bribe-giver to the bribe amount.*

Proof. Comparing equation 4.5 and 4.8. CLI works better in inducing bribe reporting by the bribe-giver than BP if

$$p' f_c > b(p - p')$$
$$\implies \frac{p - p'}{p'} < \frac{f_c}{b}$$

The above propositions suggests that in order to encourage the reporting under conditional legal immunity, the probability of detection when bribery is not reported must be

significantly greater than zero, and the fine imposed on the citizen must be significantly greater than the bribe amount.

4.4 Conclusion

Harassment bribes are widely prevalent in many developing countries of the world. These bribes are often small in the amount relative to the benefit from the corresponding services. However, these bribes cause great inconvenience to the lives of ordinary and poor people. The most affected section of the society are the poorest and the prevalence of bribery denies them access to the basic health and education facilities because the poor are unable to pay bribes in many instances. Since in such types of bribes, the borrowers do not receive any undue favors and are forced to pay the bribe even for the services they are entitle to, these bribes are known as harassment or extortionary bribes. In view of this fact, some researchers have proposed the idea that in case of this special class of bribes, the bribe givers should be given legal immunity. The proponents of such policies argue that an asymmetric liability policy would induce bribe givers to report bribe incidences leading to fall in the bribery.

This chapter explores the possibility that an asymmetric liability policy can reduce bribe occurrences by encouraging the reporting of bribes. The theoretical findings indicate that an asymmetric liability policy may not be enough in reducing bribery. A high cost of reporting and establishing the bribery undermines the effectiveness of an asymmetric liability policy and, hence, it needs to be complemented with other incentive mechanisms. A modification in the asymmetric liability policy is suggested and is shown to be more effective in curbing bribery.

Chapter 5. Conclusions

This dissertation investigates three important issues related to corruption in three different essays. The first two essays of the dissertation are empirical, and the third essay develops a theoretical model. Some of the issues taken up in this dissertation had earlier been investigated by previous studies but needed further investigation since the findings were ambiguous. For instance, the causality between gender and corruption was not established by the previous studies and the second chapter of this dissertation addresses the concerns for causality in this literature. Some other issues have been investigated for the first time in this thesis. For example, Chapter 3 of this dissertation is the first quantitatively comprehensive study that investigates whether the social media can have a negative impact on corruption. Finally, Chapter 4 adds to the existing literature on the legal system and bribery by investigating some of the contemporary issues and hypotheses by building upon previous studies and extending the previous analysis. The main findings of this thesis are summarized below with the possible extensions and the policy suggestions.

It is women's presence only in politics that matters for corruption. Women's presence in other positions such as decision-making positions, clerical positions, and the labor force does not have any impact on corruption. These findings suggest that women policymakers are affecting corruption since they tend to choose different policies than men. The future work on this topic should explore the channels through which women, as policy makers, are able to affect corruption more extensively. Identifying the policies that reduce corruption will be an important step towards understanding the causal link between women's representation in politics and corruption. Although the thesis provides suggestive evidence that gender differences in social status do not seem to be driving the association between gender and corruption, more research on this topic is required and may provide further insights on the interaction between gender and corruption.

Facebook penetration and internet penetration are negatively related to corruption. Social media and the internet, therefore, have a potential to fight against corruption through an increase in transparency, facilitating the communication, and curtailing the ability of authoritarian governments to control the transmission of information. As a result, acts of corruption and bribery become more costly to commit as there are greater chances that the act will be discovered. The future research should employ the social media usage more broadly and investigate the impact of social media platforms, such as Twitter, Google Plus, and YouTube, along with Facebook, on corruption. The role of blogs, technological advancements that allow for greater anonymity in using websites, and the privacy settings of social media platforms in affecting corruption should also be explored.

Finally, awarding legal immunity to the bribe givers may not be sufficient to reduce bribery in the case of harassment bribes. Therefore, an asymmetric liability policy may fail to deliver desired outcomes, especially in countries where corruption is so rampant that the cost of bribe reporting is extremely high. A modification in the asymmetric liability policy, therefore, is required that further incentivizes the bribe giver to report the bribe incident. One such modification could be a situation where the bribe giver is given legal immunity only when he/she reports the bribery.

Corruption is an issue whose solution requires concerted efforts from various sections of the public and the policymakers. In order to successfully fight corruption, multiple actions need to be taken in different areas such as empowering the disadvantaged sections of the society, increasing the accessibility of technology, improving the institutional quality and the effectiveness of the legal system, creating a culture of transparency, lessen hierarchy, instilling moral values, restructuring the incentive mechanisms for public employees, and creating awareness. This dissertation identifies three instruments that can be used to fight corruption.

Following are the policy implications that emerge from this dissertation. Women's empowerment in politics and government should be encouraged. Policies that promote women's

political empowerment have positive externalities as, apart from achieving the much-needed gender equality, they are also likely to impact corruption negatively. Infrastructural facilities that make internet accessible to all should be provided. Freedom and transparency on the net including social media should be promoted. The scope of e-governance should be expanded. For the class of extortionary bribes, the implementation of an asymmetric liability policy that is milder on the bribe-giver and harsher on the bribe-taker, should be contemplated and debated. There is also a need for further incentivization in order to make bribe-givers report bribery, either through a punishment mechanism or through making bribe-reporting easier or reducing the probability that the bribe-taker might retaliate. Similar policies must be explored for the collusive bribery.

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Appendix

Table A.1: Corruption in the World, 2011.

Country/Territory	World Bank Country Code	Control of Corruption Index	Corruption Perception Index
AFGHANISTAN	AFG	-1.55	1.52
ALBANIA	ALB	-0.61	3.05
ALGERIA	DZA	-0.56	2.90
AMERICAN SAMOA	ASM	0.36	
ANDORRA	ADO	1.31	
ANGOLA	AGO	-1.36	2.01
ANGUILLA	AIA	1.31	
ANTIGUA AND BARBUDA	ATG	1.31	
ARGENTINA	ARG	-0.39	3.00
ARMENIA	ARM	-0.58	2.63
ARUBA	ABW	1.12	
AUSTRALIA	AUS	2.16	8.84
AUSTRIA	AUT	1.44	7.79
AZERBAIJAN	AZE	-1.14	2.38
BAHAMAS, THE	BHS	1.36	7.29
BAHRAIN	BHR	0.23	5.11
BANGLADESH	BGD	-1.00	2.66
BARBADOS	BRB	1.76	7.77
BELARUS	BLR	-0.74	2.42
BELGIUM	BEL	1.58	7.49
BELIZE	BLZ	-0.26	
BENIN	BEN	-0.67	2.97

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Table A.1 – continued from previous page

Country	World Bank Country Code	Control of Corruption Index	Corruption Perception Index
BERMUDA	BMU	1.31	
BHUTAN	BTN	0.74	5.74
BOLIVIA	BOL	-0.46	2.76
BOSNIA AND HERZEGOVINA	BIH	-0.27	3.21
BOTSWANA	BWA	0.97	6.08
BRAZIL	BRA	0.17	3.77
BRUNEI DARUSSALAM	BRN	0.84	5.21
BULGARIA	BGR	-0.17	3.33
BURKINA FASO	BFA	-0.38	3.05
BURUNDI	BDI	-1.12	1.94
CAMBODIA	KHM	-1.10	2.11
CAMEROON	CMR	-0.97	2.45
CANADA	CAN	1.98	8.67
CAPE VERDE	CPV	0.80	5.52
CAYMAN ISLANDS	CYM	1.35	
CENTRAL AFRICAN REPUBLIC	CAF	-0.85	2.21
CHAD	TCD	-1.25	2.04
CHILE	CHL	1.57	7.21
CHINA	CHN	-0.67	3.64
COLOMBIA	COL	-0.31	3.45
COMOROS	COM	-0.70	2.41
CONGO, DEM. REP.	ZAR	-1.37	2.02
CONGO, REP.	COG	-1.11	2.15
COOK ISLANDS	COK	-0.20	
COSTA RICA	CRI	0.59	4.80
CÔTE D'IVOIRE	CIV	-1.10	2.23
CROATIA	HRV	0.02	4.03
CUBA	CUB	0.44	4.16

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Table A.1 – continued from previous page

Country	World Bank Country Code	Control of Corruption Index	Corruption Perception Index
CYPRUS	CYP	0.96	6.27
CZECH REPUBLIC	CZE	0.32	4.37
DENMARK	DNK	2.42	9.39
DJIBOUTI	DJI	-0.30	2.98
DOMINICA	DMA	0.74	5.17
DOMINICAN REPUBLIC	DOM	-0.79	2.59
ECUADOR	ECU	-0.82	2.65
EGYPT, ARAB REP.	EGY	-0.68	2.86
EL SALVADOR	SLV	-0.23	3.42
EQUATORIAL GUINEA	GNQ	-1.49	1.91
ERITREA	ERI	-0.55	2.48
ESTONIA	EST	0.91	6.35
ETHIOPIA	ETH	-0.69	2.69
FIJI	FJI	-0.49	
FINLAND	FIN	2.19	9.40
FRANCE	FRA	1.51	7.01
FRENCH GUIANA	GUF	1.12	
GABON	GAB	-0.77	2.98
GAMBIA, THE	GMB	-0.50	3.51
GEORGIA	GEO	-0.02	4.13
GERMANY	DEU	1.69	8.05
GHANA	GHA	0.13	3.85
GREECE	GRC	-0.15	3.39
GREENLAND	GRL	1.22	
GRENADA	GRD	0.44	
GUAM	GUM	0.83	
GUATEMALA	GTM	-0.52	2.73
GUINEA	GIN	-1.17	2.11

Continued on next page

Table A.1 – continued from previous page

Country	World Bank Country Code	Control of Corruption Index	Corruption Perception Index
GUINEA-BISSAU	GNB	-1.06	2.20
GUYANA	GUY	-0.60	2.49
HAITI	HTI	-1.27	1.80
HONDURAS	HND	-0.80	2.59
HONG KONG	HKG	1.84	8.39
HUNGARY	HUN	0.34	4.56
ICELAND	ISL	1.94	8.27
INDIA	IND	-0.56	3.10
INDONESIA	IDN	-0.68	3.03
IRAN, ISLAMIC REP.	IRN	-0.91	2.72
IRAQ	IRQ	-1.22	1.80
IRELAND	IRL	1.50	7.54
ISRAEL	ISR	0.68	5.81
ITALY	ITA	-0.01	3.91
JAMAICA	JAM	-0.38	3.34
JAPAN	JPN	1.50	8.04
JERSEY, CHANNEL ISLANDS	JEY	1.22	
JORDAN	JOR	0.01	4.49
KAZAKHSTAN	KAZ	-1.01	2.69
KENYA	KEN	-0.92	2.24
KIRIBATI	KIR	0.13	3.08
KOREA, DEM. REP.	PRK	-1.38	1.01
KOREA, REP.	KOR	0.45	5.36
KOSOVO	KSV	-0.62	
KUWAIT	KWT	0.07	4.62
KYRGYZ REPUBLIC	KGZ	-1.13	2.12
LAO PDR	LAO	-1.06	2.21
LATVIA	LVA	0.21	4.19

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Table A.1 – continued from previous page

Country	World Bank Country Code	Control of Corruption Index	Corruption Perception Index
LEBANON	LBN	-0.91	2.49
LESOTHO	LSO	0.22	3.52
LIBERIA	LBR	-0.44	3.19
LIBYA	LBY	-1.31	2.01
LIECHTENSTEIN	LIE	1.81	
LITHUANIA	LTU	0.29	4.75
LUXEMBOURG	LUX	2.17	8.51
MACAO	MAC	0.46	5.11
MACEDONIA, FYR	MKD	-0.02	
MADAGASCAR	MDG	-0.28	3.04
MALAWI	MWI	-0.39	3.00
MALAYSIA	MYS	0.00	4.31
MALDIVES	MDV	-0.63	2.47
MALI	MLI	-0.61	2.76
MALTA	MLT	0.91	
MARSHALL ISLANDS	MHL	-0.25	
MARTINIQUE	MTQ	0.83	
MAURITANIA	MRT	-0.57	2.43
MAURITIUS	MUS	0.62	5.07
MEXICO	MEX	-0.36	2.97
MICRONESIA, FED. STS.	FSM	-0.30	
MOLDOVA	MDA	-0.62	2.88
MONGOLIA	MNG	-0.68	2.68
MONTENEGRO	MNE	-0.21	3.97
MOROCCO	MAR	-0.26	3.44
MOZAMBIQUE	MOZ	-0.41	2.69
MYANMAR	MMR	-1.69	1.49
NAMIBIA	NAM	0.22	4.43

Continued on next page

Table A.1 – continued from previous page

Country	World Bank Country Code	Control of Corruption Index	Corruption Perception Index
NAURU	NRU	0.01	
NEPAL	NPL	-0.77	2.21
NETHERLANDS	NLD	2.17	8.89
NETHERLANDS ANTILLES (FORMER)	ANT	0.83	
NEW ZEALAND	NZL	2.33	9.46
NICARAGUA	NIC	-0.76	2.53
NIGER	NER	-0.65	2.54
NIGERIA	NGA	-1.14	2.45
NIUE	NIU	-0.41	
NORWAY	NOR	2.17	8.99
OMAN	OMN	0.08	4.83
PAKISTAN	PAK	-1.00	2.47
PALAU	PLW	-0.46	
PANAMA	PAN	-0.35	3.27
PAPUA NEW GUINEA	PNG	-1.12	2.17
PARAGUAY	PRY	-0.73	2.22
PERU	PER	-0.20	3.39
PHILIPPINES	PHL	-0.78	2.64
POLAND	POL	0.51	5.48
PORTUGAL	PRT	1.09	6.10
PUERTO RICO	PRI	0.49	5.59
QATAR	QAT	1.02	7.16
RÉUNION	REU	0.83	
ROMANIA	ROM	-0.20	3.61
RUSSIAN FEDERATION	RUS	-1.09	2.45
RWANDA	RWA	0.45	4.98
SAMOA	WSM	0.11	3.88
SÃO TOMÉ AND PRINCIPE	STP	-0.37	2.99

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Table A.1 – continued from previous page

Country	World Bank Country Code	Control of Corruption Index	Corruption Perception Index
SAUDI ARABIA	SAU	-0.29	4.39
SENEGAL	SEN	-0.62	2.87
SERBIA	SRB	-0.20	3.31
SEYCHELLES	SYC	0.26	4.82
SIERRA LEONE	SLE	-0.77	2.46
SINGAPORE	SGP	2.12	9.17
SLOVAK REPUBLIC	SVK	0.29	3.97
SLOVENIA	SVN	0.93	5.87
SOLOMON ISLANDS	SLB	-0.44	2.71
SOMALIA	SOM	-1.72	0.98
SOUTH AFRICA	ZAF	0.03	4.08
SOUTH SUDAN	SSD	-1.65	
SPAIN	ESP	1.06	6.23
SRI LANKA	LKA	-0.42	3.30
ST. KITTS AND NEVIS	KNA	1.06	
ST. LUCIA	LCA	1.24	7.02
ST. VINCENT & THE GRENADINES	VCT	1.06	5.76
SUDAN	SDN	-1.30	1.56
SURINAME	SUR	-0.36	3.03
SWAZILAND	SWZ	-0.27	3.08
SWEDEN	SWE	2.22	9.30
SWITZERLAND	CHE	2.02	8.80
SYRIAN ARAB REPUBLIC	SYR	-0.97	2.56
TAIWAN, CHINA	TWN	0.90	6.14
TAJIKISTAN	TJK	-1.15	2.27
TANZANIA	TZA	-0.52	2.95
THAILAND	THA	-0.37	3.38
TIMOR-LESTE	TMP	-1.05	2.38

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Table A.1 – continued from previous page

Country	World Bank Country Code	Control of Corruption Index	Corruption Perception Index
TOGO	TGO	-0.99	2.38
TONGA	TON	-0.29	3.14
TRINIDAD AND TOBAGO	TTO	-0.28	3.17
TUNISIA	TUN	-0.21	3.76
TURKEY	TUR	0.10	4.21
TURKMENISTAN	TKM	-1.46	1.60
TUVALU	TUV	-0.47	
UGANDA	UGA	-0.90	2.43
UKRAINE	UKR	-0.98	2.30
UNITED ARAB EMIRATES	ARE	1.08	6.82
UNITED KINGDOM	GBR	1.54	7.78
UNITED STATES	USA	1.25	7.14
URUGUAY	URY	1.28	7.04
UZBEKISTAN	UZB	-1.34	1.62
VANUATU	VUT	0.35	3.53
VENEZUELA, RB	VEN	-1.22	1.89
VIETNAM	VNM	-0.63	2.86
VIRGIN ISLANDS (U.S.)	VIR	0.83	
WEST BANK AND GAZA	WBG	-0.83	
YEMEN, REP.	YEM	-1.18	2.08
ZAMBIA	ZMB	-0.51	3.20
ZIMBABWE	ZWE	-1.30	2.23

The CCI takes values in the range of -2.5 to 2.5, and CPI takes values in the range of 0 to 10. Higher values of both the indices imply lower corruption. The CCI covers more countries than CPI and hence missing values for the CPI.

Vita

Chandan Kumar Jha was born in Shri Khandhi Bhitha, a small and beautiful village in the Indian state of Bihar, situated at the border of India and Nepal. He completed his Bachelor of Arts in Economics from Magadh University in 2007 and earned a Masters of Arts in Economics from Gokhale Institute of Politics and Economics in 2010. He began pursuing the doctoral degree in Economics at Louisiana State University in Fall 2010 and earned a Masters of Science in Economics in 2012 in the process. His primary research focus is in the area of development economics and his current research topics include the issues of corruption and gender inequality. He also contributes articles to *Ideas for India*, an economics and policy portal and often writes Op-Eds on economic, social, and policy issues for the *Hindu Business Line*, a leading Indian business daily.